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# WEED ABSTRACTS

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# NOTES FOR READERS OF WEED ABSTRACTS

Weed Abstracts endeavours to provide a comprehensive coverage of the world's literature on weeds, weed control and closely allied subjects. To this end, over 370 journals and nearly 100 annual reports are regularly searched. Other journals, reports, bulletins, etc. are abstracted as they are seen. Additional coverage is obtained through agreements with other abstracting organisations.

Abstractors

L. Kasasian (Editor)
D.M.L. Sparrow
J.W. Frampton
M.E. Lewis
P.C. Crossfield

Correspondence about subscriptions to Weed Abstracts should be addressed to: The Treasurer, British Weed Control Council, c/o National Association of Corn and Agricultural Merchants, Cereal House, 58 Mark Lane, London, E.C.3. Other correspondence should be addressed to: Information Section, A.R.C. Weed Research Organisation, Department of Agriculture, Parks Road, Oxford.

As far as possible journal abbreviations given in the World List of Scientific Periodicals are used. Holding libraries in Oxford and elsewhere are also taken from the World List, e.g. O.BO. = Botany Department, Oxford. Numbers at the end of abstracts, e.g. 75(492) are for internal use only.

When a paper is by more than one author, only the address of the first author is given.

Where an abstracts is taken from an abstracting journal the acknowledgement follows the abstract, e.g. Herb.Abstr., 2,163. Where it is only quoted in part the acknowledgement is preceded by the word "from", e.g. From Biol.Abstr., 2.294.

The Information Section is always pleased to receive comments and suggestions for the improvement of Weed Abstracts.

* An asterisk before the author's name indicates that only the title of the paper has been seen.

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|---|---|---|---|---|---|
| ac | - acre(s) | in. | - inch(es) | p.s.i. | - pounds per square in. |
| a.e. | - acid equivalent | kg | - kilogram(s) | v/v | - volume/volume |
| a.i. | - acid ingredient | l | - litre(s) | w/v | - weight/volume |
| cm | - centimetre(s) | lb | - pound(s) | w/w | - weight/weight |
| d.b.h. | - diameter at breast height | m | - metre(s) | > | - greater than |
| ft | - foot (feet) | ml | - millilitre(s) | < | - less than |
| g | - gram(s) | oz | - ounce(s) | # | - pounds per acre |
| gal | - gallon(s) | post-em. | - post-emergence | ± | - with or without |
| ha | - hectare(s) | pre-em. | - pre-emergence | | |
| | | p.p.m. | - parts per million | | |

Language abbreviations: an initial capital denotes the language of the article, a small letter that of the summary: - Dan. - Danish, Du. - Dutch, E. - English, F. - French, G. - German, It. - Italian, Jap. - Japanese, Nor. - Norwegian, Russ. - Russian, Span. - Spanish, Sw. - Swedish.

See also 1763, 1765, 1772, 1773, 1805, 1807, 1810, 1812, 1823, 1848, 1857.

1711. GAUDEFROY-DEMOMBYNES, P. Activites du Centre de Recherches Agronomiques de Bambey dans la region du fleuve Senegal (hors zone deltaique) 1955-1956. [Work of the Agronomic Research Centre, Bambey, in the River Senegal region (outside the delta area) 1955-6.] Bull.agron.Fr.d'out.mer, 1959, 16, 127-58, (F.)

An account of trials mainly with sorghums. Mechanical weeding is one of the principal aspects considered. - From Field Crop Abstr., 13, (3), 1147. - D.M.L.S.

1712. GARCIDUENAS, M. ROJAS and RUBIO, C.J. Efectos del acido 2,4-diclorofenoxiacetico sobre la poblacion de malezas en sorgo (Sorghum vulgare var. roxburghii). [Effect of 2,4-D on the weed population in sorghum (S. vulgare var. roxburghii).] Ciencia, Mex., 1959, 19, (4/5), 74-6, (Span.e.)

In the plot trial described, treatment with 2,4-D, 49.5% a.e., was applied to spring-sown sorghum var. Shallu dwarf. Johnson grass (Sorghum halepense) was the only noxious grass weed present; other important weeds were Croton dioicus, Parthenium hysterophorus, Solanum rostratum, Tagetes sp. and Raphanus sp. The yields of sorghum (kg/54 m² plot) from the 5 treatments tested were: tractor-cultivated 3 times, 5.23; hoed 3 times, 5.05; treated with 2,4-D once (1 kg a.e./ha before emergence) 4.67; treated with 2,4-D once (0.75 kg a.e./ha, after emergence), 3.54; untreated control, 3.16. The effect of 2,4-D on the competition between crop and weeds is discussed. Treatment with 2,4-D resulted in increased growth of Johnson grass because of lack of competition from other weeds. - Field Crop Abstr., 13, (3), 1145.

1713. LAST, F.T. (Gezira Res.Sta., Wad Medani, Sudan). Effect of cultural treatments on the incidence of Striga hermonthica (Del.) Benth. and yields of sorghum in the Sudan; field experiments 1957/8. Ann.appl. Biol., 1960, 48, (2), 207-29, figs.7, tabs.13, bibl.37.

S. hermonthica developed more on var. Debeckri than Feterita. Usually applying increasing amounts of nitrogen [N] (sulphate of ammonia or urea) progressively decreased its incidence on Feterita, Dwarf White Milo and Wad Fahl. Early applications were more effective than late. N given to Debekri never significantly decreased the amount of S. hermonthica and often increased it. In an experiment on very infertile and heavily infested soil N increased the amounts of S. hermonthica on all varieties but less on Feterita than Debekri; the weights on Feterita reached a maximum with 40 lb N/ac but were still increasing after adding 80 lb N to Debekri.

2,4-D affected S. hermonthica on Feterita and Debekri equally. It delayed the appearance of its aerial stems and usually decreased their subsequent growth; 1.6 # was generally more effective than 0.8 # and spraying 3 weeks after sowing was sometimes better than 2 weeks after.

Trap cropping with Sorghum sudanense for 5 weeks, but not for 3, significantly decreased incidence in succeeding sorghum crops and sometimes increased grain yields.

Phosphorous and potassium affected neither S. hermonthica incidence nor sorghum yields. On lightly infested soil where S. hermonthica was not damaging, 80 lb N/ac trebled grain yields (from 1140 to 3530 #). As infestation increased in severity, the absolute gains decreased but the relative effects were greater. On crops infected early and severely, yields increased by 820% from 180 to 1505 #. N applied at sowing and 3 weeks after gave bigger increases than later applications (6 and 9 weeks after).

Yields. Where infection developed rapidly and the mean levels of infection were at least 20% within 50 days of sowing, 2,4-D increased both grain and straw yields; where infection developed slowly, only grain yields were increased. Although 1.6 # 2,4-D decreased S. hermonthica more than 0.8 #, they affected yields equally as did spraying 2 or 3 weeks after sowing. 2,4-D 0.8 # and N 80 # applied separately to severely infected crops increased grain yields from 38 # to only 163 and 588 # respectively, whereas applied together they gave 2170 #. In the same experiment N increased the yields of the less heavily infected Feterita more than those of Debekri whereas 2,4-D affected both varieties similarly. From Author's Summary. - D.M.L.S. [O.RE.]

1714. UBRIZSY, G. (Plant Prot.Inst., Budapest, Hungary). A kukorikaban vegzett vegyszeres gyomirtas a herbicid hatas türkreben. [Weed control in maize as seen through operation of herbicides.] Mag.Tud.acad.Agrar. Oszt.Kozlemenyei, 1960, 17, (1), 51-75, (Hungarian.russ.e.), figs.3, tabs.4, bibl.24.

Best weed control in maize follows pre-em. application of simazine or atrazine ca. 6 kg/ha which are an improvement on 2,4-D and MCPC, though for effective control of perennial weeds three times this dose is required. The tables give the response of a number of weeds to simazine, atrazine and 2,4-D. - From Author's Summary. - P.C. [13(439)]

1715. MELLANBY, K., FRENCH, R.A. and RICHES, J. (Rothamsted Exp.Sta.,Harpenden, Herts.,England). Herbicide spray and frit fly attack on oats. Ent.exp. & appl., 1959, 2,319-20.
Examination of infested tillers of sprayed and unsprayed oats (sown on 11th April) and other evidence showed that mecoprop neither killed nor repelled the frit fly.- D.M.L.S. [O.R.]

1716. HILLI, A. (Valtion Siementarkastuslaitos,Helsinki,Finland). Kotona viljellyn kevatviljan siemenkelpoisuurlesta. [The purity and condition of summer cereals.] Maataloust.Aikakaust., 1960, 32,(1),8-16, (Finnish.g.), figs.1,tabs.3.
The most important weed seeds in samples of cereals were: Avena fatua, Raphanus raphanistrum, Bromus secalinus and Centaurea cyanus. Barley was the dirtiest crop. - From Author's Summary. - L.K. [O.RE.]

1717. * WATANABE, H. and SODA, Y. [The use of chlorpropham for weeding cereal crops in the cold parts of Japan.] Nogoye Hydzustoo, 1959, 14,(9),394-6, (Jap.).

1718. VEGA, M.R. and LLENA, P.A. (Coll. Agric.,Univ.Philippines,Quezon City). The effect of some newer herbicides as pre-emergence spray. Philipp.Agric., 1959, 43,(4), 250-9, figs.2,tabs.6.
2,4-D (amide), neburon, EPTC all at 4.49 kg/ha, Benzac 103A (polychlorinated benzoic acids) 1.12 kg/ha and 2,4-DP (amine) 2.25 kg/ha were applied the day after planting Azucena upland rice. The plots were kept weedfree by handweeding; only neburon and Benzac A gave yields greater than the handweeded control and of the 2 only neburon reduced handweeding time (by 56%). A second series of plots was sprayed with Kuron [2,4,5-TP (ester)] 1 month after the pre-em. treatments; all these plots yielded less than the handweeded control; in the case of neburon (which gave the best yield and required no additional handweeding) the reduction was about 10%. - L.K. [6(914)]

1719. LEVETT, J. Rice in Hungary. World Crops, 1960, 2,58-9.
Fish (mainly carp) are bred in the flooded rice fields, thereby off-setting the cost of rice production and reducing the number of weeds, the seeds of which are eaten in large quantities by the fish. - From Field Crop Abstr., 13,(3),1153. - D.M.L.S.

1720. HEJNY, S. Nektera opatreni proti zapleveleni ryzovych poli. [Some means of controlling weeds in rice.] Vedecke Prace, 1957, 3,215-37.
A review of experiments on weed control in rice in Slovakia. The various means of weed dispersal and their extent are described and also preventive and direct methods of control. Particular reference is made to regional conditions and how they differ from the conditions already known in rice growing areas. To be economic weed control must fit in with the other cultural requirement of the crop. Reference is made to all the important weeds, e.g. Potamogeton, Heliocharis, Myriophyllum, Echinochloa, Typha etc. - Z.PflKrankh., 66,612.

1721. * UEKI, K. [The use of granular herbicides in rice fields.] Agric.& Hort., 1959, 34,(11),1723-6, (Jap.)

1722. * TSU, S. [Dusting 2,4,5-T by aeroplane for weed control in rice.] Chzhio Shenlisyue Tunsyun, 1959, (6),24-7, (Chinese).

1723. LOLI, M.R. and SCHULER, J.F. (Esta. Exp.Agric.,Junin,Peru). Control quimico de malas hierbas en cereales. [Weed control by chemicals in cereals.] Bol. trim.Exp.agropec.,Lima, 1958, 7,(2),8-11.
In the plot trial described, several chemical herbicides were tested to control weeds (listed) in wheat. As a result, the recommended treatment to control weeds other than grasses is one application of 2,4-D (amine) at 2500 cc/ha given when the wheat is 20-25 cm high. - Field Crop Abstr., 13,434.

1724. RAHMAN, F. and RICHHARIA, R.H. (Bihar Agric.Coll.,Sabour,Bhagalpur,India). Preliminary studies on the effect of certain rotations on the population of Cyperus rotundus in a wheat field. Sci. & Cult., 1959, 25,(2),158-9.
Sorghum or maize as the preceding crop in the rotation resulted in a low degree of infestation by C. rotundus in wheat, whereas Phaseolus aureus and P. mungo resulted in a high level of infestation.- From Ref.Zh.Biol., 1960, 70900. - L.K.

1725. NETHERLANDS. Onkruidbestridjing met I.P.C. [Weed control with propham.]

Meded.Inst.rat.Suikerprod., 1959, 29,(3), 73-6.

Sugar beet at the 4-leaf stage was sprayed with 5 or 7.5 kg propham in 800 l water/ha. Stellaria media and Polygonum persicaria were well controlled, especially at the higher rate of propham, but Galeopsis spp. were not affected. Yields of sugar and of roots, but not of tops, from sprayed plots were less than those from hand-weeded plots, but greater than those from unweeded plots. Some recent experiments on weed control using propham are reviewed. It is recommended that it be used only in cases of heavy infestation with Poa annua or Alopecurus myosuroides, and should be applied (a) at 7.5 kg/ha 14 days before sowing, or at 5 kg/ha, (b) 5-7 days before sowing and before preparing the seed-bed, or (c) just before singling. Treatment (c) gave good control of Matricaria chamomilla, S. media, and Fumaria officinalis, but reduced sugar yields by 300 kg/ha. - Field Crop Abstr., 13,(3),1261.

1726. WEAVER, J.B. and HAUSER, E.W. (Coll.Exp.Sta.,Athens,Georgia,U.S.A.) Response of cotton varieties to pre-emergence CIPC on piedmont soil. Agron.J., 1960, 52,(7),409.

Chlorpropham 12 and 24 # pre-em. was applied to the following varieties and strains of cotton:- Austin, Z106, SUD37, Pope, Coker 100W, SUD43, M8948, Pima S.1, Brayos, Plains and Empire. Four weeks after emergence stand and green weight were significantly affected (% germination was found to be 66, 65 and 61 following 0, 12 and 24 #, and average plant weights 1.2, 1.2 and 1.0 g respectively). There was no significant variety X herbicide interaction. The following year germination was again reduced by chlorpropham, particularly 24 #; variety X herbicide interaction was not significant, although the varieties Austin, Coker 100W and Empire showed a trend towards reduced stand following chlorpropham at 24 #; however, average over-all yield was not decreased by any rate of chlorpropham used. - J.W.F. [O.RE.]

1727. CAVINESS, C.E. and TAYLOR, M. Effect of Johnsongrass on soybean yields. Arkans.Fm Res., 1960, 9,(3),2, figs.2, tabs.1.

On a clay soil uniformly infested with Sorghum halepense no hoeing and 1 hoeing when S. halepense was in the boot stage gave a soybean yield of 12.3 and 10.9 bushels/ac respectively, compared with 32.4 bushels/ac for 2 hoeings 4 and 7 weeks after planting soybeans and 30.6 bushels/ac for plots kept free of S. halepense by hoeing every 10 days. - D.M.L.S. [O.W.]

1728. NETHERLANDS. Chemische bestrijding van wilde haver in suikerbieten. [Chemical weed control of wild oats in sugar beet.] Meded.Inst.rat.Suikerprod., 1959, 29,(3), 70-3.

The following treatments were applied in experiments to control wild oats [Avena fatua] in sugar beet, var. Hilleshög standard polyploid: (a) 30 kg dalapon/ha at the beginning of wild oat germination, 14 days before sowing sugar beet, (b) 5 kg propham + 8 kg dalapon/ha 14days before sowing, (c) 15 kg DCU/ha 6 days before sowing, (d) 14 kg dalapon/ha when the sugar beet had 2-4 leaves, (e) 7.5 kg propham/ha 14 days before sowing plus 5 kg propham/ha at the 2-4 leaf stage. Treatment (a) gave almost complete control of A. fatua and Agropyron repens and treatment (b) fairly good control. Singling the untreated plots took 15 times longer than singling plots of treatment (a). All dalapon treatments caused some phytotoxicity to the beet, but later in the season only those given treatment (d) appeared to have suffered a setback in growth. Treatments (a), (b) and (c) yielded rather better, and treatment (d) rather worse, than untreated beets. - Field Crop Abstr., 13,(3),1260.

1729. MURANT, A.F. (Scot.Hort.Res.Inst., Mylnefield,Invergowrie,Scotland). Herbicides and spring mechanisation. Brit.Sugar Beet Rev., 1960, 28,(4),179-84, figs.2,tabs.1, bibl.7.

A review. Very good selective weed control in sugar beet has been given by endothal + propham (1), this has given more consistent results than HS 55 [cyclooctyldimethylurea + butinol chlorophenylcarbamate] as the latter is more influenced by rainfall. (1) controls annual meadow grass [Poa annua], wild oats [Avena spp.], knotgrass [Polygonum aviculare], chickweed [Stellaria media], mayweed [Matricaria spp.], spurrey [Spergula arvensis], shepherd's purse [Capsella bursa pastoris], dock [Rumex spp.], scarlet pimpernell [Anagallis arvensis], and groundsel [Senecio vulgaris]; it is less effective on fat hen [Chenopodium album] or orache [Atriplex patula]. (2) gives better control of orache than (1). - L.K. [O.RE.]

1730. BECKER, A. Weitere Beispiele für Kettenwirkungen nach Anwendung von Herbiziden.

[Further examples of the chain reaction after the application of herbicides.] NachrBl. dtsch.PflSchDienst.Braunschweig, 1960, 12, (5),78-9,(G.).
Beet accidentally injured by growth regulators was more severely affected by root rot. Oats affected by growth regulator treatment have been found to be more greatly affected by frit fly. - L.K. [O.W.]

1731. BANDEEN, J.D., SWITZER, C.M. and JONES, G.E. (Ont.Agric.Coll.,Ontario,Canada). Effects of various pre-emergence herbicides on weeds and sugar beets. Proc.10th Region. Meet.Amer.Soc.Sugar Beet Tech., 1959, 36-40, tabs.2,bibl.7.
In the experiment reported the following gave the most promising results:- EPTC 4, 6 and 8 #, monuron 0.75#, 3-phenyl-1,1-dimethylurea trichloroacetate 1 and 1.8 #, CDEC 4 # + endothal 5, 7.5 and 12.5 #, and CDEC 4 # + chlorpropham 0.5, 1 and 3 #. EPTC 8 # caused stunting of the beet and the mixture of chlorpropham 3 # + CDEC 4 # caused injury which was primarily stunting. However, in both cases the beet recovered and yield was little affected. Weeds were mainly lambsquarters [Chenopodium album], pigweed [Amaranthus retroflexus] and ragweed [Ambrosia artemisiifolia]. Endothal seemed to increase the effectiveness of CDEC although alone it gave poor results. - D.M.L.S. [234(71)]

1732. MAKODZEVA, I.O. and PODOPRIGORA, V.S. [New effective herbicides for weed control in sugar beets and soybeans.] Dopov.Ukr. Akad.Silsk.Nauk., 1959, (4),30-2, (Ukrainian. russ.)
Ammonium iminodisulphonate 20 and 40 kg/ha decreased the weediness of sugar beet to 40 and 13.7% and of soybeans to 54.7 and 31.2% respectively. Root yields of beet were raised 6.6 and 18.8% and seed yield of soybeans by 12.8 and 27.9%. The compound also acts as a nitrogenous fertiliser. - From Ref. Zh.Biol., 1960, 70914. - L.K.

1733. GUSTAFSSON, N. Missfärgar blastdödningen potatisens kärlringar? [Does haulm-killing cause vascular ring discoloration in potatoes?] Lantm.Svenskt Land., 1960, 71, (16),364-5.
The possible connection between the use of chemical haulm-killers and vascular ring discoloration in potato tubers is discussed in the light of cases of this disorder which occurred in Sweden in 1959. It is concluded that the dry, hot conditions of that year were principally responsible for the disorder and that in seasons with similar weather it is not advisable to interrupt the growth of potatoes by using haulm-killers; where they are used, they should not be applied in amounts which exceed those recommended. - Field Crop Abstr., 13,(3),1305.

1734. POOLE, W.D., HERNANDEZ, TRAVIS, P. and HERNANDES, TEME, P. (Agric.Exp.Sta., Baton Rouge,La,U.S.A.) Chemical weed control in sweet potatoes. Progress Report No. 5. Mimeo.Circ.agric.Engng Dep., 1960, 25, pp.5.
Recommended treatments, which should be made after planting at least 3-4 in. deep but before weed emergence, are chlorpropham (spray or granular) 5 # and NPA (amide) ca. 5 #. A second application may be made after ridging. - L.K. [30(76.3)]

1735. DOWLER, C.C. and WILLARD, C.J. (Ohio Agric.Exp.Sta.,Wooster,Ohio,U.S.A.) Using herbicides on alfalfa and birdsfoot trefoil. Res.Bull.Ohio agric.Exp.Sta., 1960, 859, pp.19, figs.7,tabs.2,bibl.8.
The experiments were conducted on good silt and silty clay loam, with three replications, and heavy seeding was employed on a good, well fertilised seedbed. Amine formulations of 2,4-DB and MCPB were used, plus the esters in 1956, and all treatments were made in 40 gal water at 40 lbs p.s.i. Ryegrass [Lolium spp.] and German millet [Setaria italica] were sown to simulate weeds, and a natural infestation of lambsquarters [Chenopodium album] and pigweed [Amaranthus retroflexus] occurred.
Pre-em. treatment with 2,4-DB and MCPB gave poor weed control at 4 oz/ac, while a rate of 1 # resulted in severe crop damage. There was heavy rainfall after treatment, increasing the efficiency of phenoxybutyric compounds. EPTC gave 90% control of grassy weeds, with fair control of others, while neburon up to 2 # gave fair control without injuring the crop.
Emergence applications of 2,4-DB and MCPB were extremely toxic to the crop at 0.5 # upwards as also when combined with dalapon, whereas dalapon alone controlled grassy weeds only at 1 and 2 #.
2-4 leaf stage applications of 2,4-DB and MCPB had a wider range of safety than 2,4-D. The best treatment proved to be 2 # dalapon + 1 lb 2,4-DB. Dinoseb is not recommended.
At the 6-8 leaf stage, all the above mentioned herbicides gave poor weed control and resulted in severe crop damage. - P.C. [49(77.1)]

1736. JANETT, D.L. (Dep.Agric.,Pukekohe, New Zealand). Eradicating kikuyu grass by

cultivation. N.Z.J.Agric., 1960, 100,(4), 331-2, figs.4.
Pennisetum clandestinum was successfully eradicated and the pasture improved by the following programme: first season - after the first cut in early January (N.Z.season) 4 rotary hoeings at intervals up to end of February then 2 harrowings and choumoellier sown; second season - after grazing of the winter crop, 2 rotary hoeings (the first in December) and drilling partly with turnips at 0.75 # and partly with millet 20 # with 3-4 cwt of serpentine superphosphate. Both these crops were grazed and in February cultivation was begun and 3-4 rotary hoeings given at fortnightly intervals after which the area was harrowed 3 times and then rolled. A pasture mixture was then sown consisting of 25 # perennial ryegrass, 5 # of short rotation ryegrass, 5 # of cocksfoot, 2 # of white clover and 2 # of cowgrass; 4 cwt of superphosphate was included. - D.M.L.S. [O.RE.]

1737. JONES, L. (Grassland Res.Inst., Hurley,nr.Maidenhead,Berks.,England). Chemical weed control and grassland. N.A.A.S.Quart.Rev., 1960, 11,(48),166-70, bibl.10.
A brief review. - D.M.L.S. [O.RE.]

Noted

1738N. MONTILLA, J.A. Aplicacion de herbicidas en maiz. [Herbicides in maize.] Ingen.agron.(Venez.), 1959, 2,14-20, (Span.), figs.5,bibl.45.
American work is briefly reviewed and some (undetailed) account given of trials with simazine and 2,4-D in Venezuela. 2-4 kg/ha of simazine (commercial formulation) gave effective control of "bejuquillo". - D.M.L.S. [7(87)]

## HORTICULTURAL, ORNAMENTAL AND PLANTATION CROPS

See also 1763,1811,1823,1848.

1739. CANADA. Your guide to chemical weed control in horticultural crops. Publ.Ont.Dep.Agric., 1960, (rev.), 75B, pp.20.
Revised recommendations which include TCA 5-8 # for seedling grasses in asparagus, MCPB 2-3 pints/20 gal water for seedling annuals in celery, Vegadex [CDEC] 5-7 # for germinating annuals in lettuce, and Randox [CDAA] 3-6 lb/50 gal water pre-em. in onions for germinating annuals and seedling grasses. - D.M.L.S. [236(71)]

1740. den BOER, W. Beschadiging door natriumchloraat. [Damage due to sodium chlorate.] Tijdschr.PlZiekt., 1958, 64,144-9, figs.,bibl.17.
Damage by sodium chlorate to vines, lettuce, cucumber, tomatoes and cauliflower is described. There was a difference in the susceptibility of these crops to damage, and a seasonal effect was also observed with young plants. Recovery of the plants may be hastened by washing sodium chlorate from the top soil. - Hort.Abstr., 28,3570.

1741. GREAT BRITAIN. Weed investigations. Rep.Nat.Veg.Res.Sta.1959, 1960, 44-5, bibl.4.
Ecology. Vegetable cropping further reduced the average weed seed population in the fourth year of the experiment, to only 8% of the original number. It was found that with Senecio vulgaris in August, achenes capable of germination were present in the capitula 5 days after flowering while ripe seed was formed 11 days after flowering. These intervals became longer later in the season and by November had extended to 20 and 25 days.
Chemical control. Further work confirmed that dinoseb (amine) is useful as a residual pre-em. weedkiller in runner beans and in dwarf and climbing French beans. Simazine 0.75 # pre-em. gave excellent weed control without adverse effect on yield in spring sown field and broad beans, but higher rates caused injury; a mixture of chlorpropham 1 + fenuron 0.25 # also gave good weed control without affecting yields in these crops and in addition gave good results in peas. Further work confirmed previous results with simazine pre-em. in sweet corn; almost complete weed control during the crop's life was achieved without adverse effect on crop yield or maturity.
In exploratory pre-em. trials in which atrazine, propazine and trietazine were compared with simazine in 12 vegetable crops, atrazine appeared to be the most phytotoxic and was not adequately selective. Propazine showed the same degree of weed control as simazine and was more selective in carrots, parsnips and parsley. Trietazine was the least phytotoxic and required somewhat higher rates to control weeds; these rates had little effect on broad beans, dwarf French beans, field beans and peas. Work will be continued with propazine and trietazine. Amiben pre-em. gave good results in carrots, parsnips and

parsley and showed promise in large-seeded legumes. On light soil, chlorpropham 0.75 # pre-em. in autumn-drilled White Lisbon onions gave almost complete control of Stellaria media and Poa annua throughout the winter; addition of fenuron always increased crop injury. - D.M.L.S. [O.RE.]

1742. ORSENIGO, J.R. (Everglades Exp.Sta., Belle Glade, Florida, U.S.A.) Primary evaluation of pre- and post-emergence applied herbicides in vegetable and field crops spring, 1959. Mimeo.Rep.Everglades Exp.Sta., 1959, 60-7, pp.32, tabs.29.

Tabulates the tolerance of 28 crops and of grass and broadleaved weeds on organic soil to non-replicated herbicidal treatments. Pre-em. herbicides were liquid or granular formulations of amiben, Dinoben (3-nitro-2,5-dichlorobenzoic acid), CDAA, CDEC, chlorpropham, dalapon, diuron, dinoseb, EPTC, HCA (hexachloroacetone), simazine, atrazine, 2,4-D (amine), 2,4,5-TP and O-2,4-dichlorophenyl-O-methyl isopropylphosphoroamidothioate, and liquid formulations of 3Y9, MCPA, 2,4-DB, mecoprop (amine salt), fenac (sodium, amide and ester), 2-chloro-4-fluorophenoxyacetic acid (dimethylamine salt), 2-chloro-4-fluorophenoxy ethanol (sodium sulphate), 4-(2-chloro-4-fluorophenoxy) butanol (sodium sulphate), 4-(2-chloro-4-fluorophenoxy)-butyric acid (dimethylamine), 2,3-dichloroallyl di-isopropylthiocarbamate, 2-chloro-4,6-bis(diethylamino)-s-triazine, 2-chloro-4-isopropylamino-6-methylamino-s-triazine, 2-chloro-4-isopropylamino-6-methylamino-s-triazine, 2-methoxy-4,6-bis(isopropylamino)-s-triazine, PCP + diesel oil, dimethyl 2,3,5,6-tetrachloroterephthalate, fenuron-TCA, monuron-TCA, dalapon (ester) + 2,4,5-TP and monuron. Evaluations based on non-weeded and hand-weeded controls were made at 3 weeksand at 6 weeks after applications. Tolerances of crops and weeds to granular > liquid formulations, but granular amiben and Dinoben gave longer lasting weed control than the liquids. Weed or crop tolerances were not influenced by the addition of glycerine to liquid CDAA, CDEC or chlorpropham. Optimum weed control with least crop damage resulted from liquid or granular CDEC 4 # or CDAA 4 # pre-em.

Post-em. herbicides were CDAA, CDEC, CP-10543 (3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea), mecoprop (amine salt), dalapon, FW-734 [N-3,4-dichlorophenylpropionamide], 2,4-DB, dalapon (ester) + 2,4,5-TP, CP-9703, 2-(sodiumsulpho)ethyl-2,2-dichloropropionate, atrazine, sodium 2,3-dichloroisobutyrate, diquat, NIA-4512 (N-(3-chloro-4-methylphenyl)-2-methylpentanamide), NIA-4556 (N-(3,4-dichlorophenyl)methylacrylamide), NIA-4567 (N-(3,4-dichlorophenyl)-2-methylpentanamide) and endothal. Tolerances were evaluated at 10 days and 3 weeks after treatments.

The following controlled both grass and broadleaf weeds, tolerant crops are in brackets:- diquat 0.5-1 # (none), endothal 4 # (none), atrazine 4 # (corn, sorghum), CP-10543 4 # (carrots, field corn), FW-934 4 # (rice highly, Chinese cabbage partially), NIA-4512 4 # (carrots and Alabama crowder), NIA-4556 4 # (carrots) and NIA-4562 4 # (carrots); dalapon 4 # and CP-9703 3 # controlled grasses (snapbean, Chinese cabbage, carrots, leaf crops, peppers, and tomatoes); mecoprop 1.5 # controlled broadleaf weeds (no tolerant crops).

The crops were field corn, sweet corn, oat, sorghum, rice, snapbean (bush and pole), lima bean, southern pea (Californian blackeye and Alabama crowder), soybean, English peas, kenaf, tomato, pepper, broccoli, cabbage, Chinese cabbage, radish, carrot, parsley, cucumber, onion, endive, escarole, lettuce (leaf and head) and romaine. - M.E.L. [38(75.9)]

1743. LACHOVER, D., HURWITZ, S. and LESHEM, Y. (Agric.Res.Sta., Rehovot, Israel). Chemical composition of selective oils and determination of optimal carrot spraying conditions. Rec.agric.Res.Sta.Rehovot, Ktavim, 1958, 8,307-35, figs.9, tabs.9, bibl.25.

Describes experiments at Beit Dagan (on the Coastal Plain) and in the Beit Shean Valley to determine the optimal conditions for spraying carrots under local circumstances. Seven oils, having a range of aromatic content of 23-34%, were applied to plants at the 2-leaf stage (ca. 3 weeks after germination). Factors which increased phytotoxicity were: (a) aromatic content (optimal value 25%) and chemical structure of the oils, (b) high insolation rate - in early autumn (September) or late spring (May), the injury resulting from noon spraying (high insolation) was greater than that from morning or evening spraying; in December or October, injury from early morning spraying was greater than that from noon spraying since, due to the low morning temperature, the volatilization rate of oils was low. Phytotoxicity to carrots was lowered by presence of moisture on foliage whereas herbicidal efficiency was only slightly decreased. Phytotoxicity was not significantly influenced by soil moisture or by relative humidity; in general, temperature did not influence phytotoxicity except in the lower ranges mentioned above. Adulteration of the oils by traces of copper or rust did not appear to increase the phytotoxicity. Laboratory methods for the determination of aromatic oils content, distillation range, volatilization rate and

average chemical structure of the oils are given. Weeds susceptible to the oils were Portulaca oleracea, Scolymus maculatus, Amaranthus graecizans, A. lividus, Cynodon dactylon, Digitaria sanguinalis, Xanthium spinosum, Oxalis cernua and cereals; non-susceptible weeds were Prosopis falcata, Hypericum serpyllifolium and Daucus maximus. The following were not eradicated but were retarded by spraying and later smothered by carrots - Raphanus raphanistrum, Convolvulus arvensis, C. betoneafolius, Crozophora tinctoria, Scorpiurus sulcata, Arisarum vulgare, Malva parviflora, Corchorus trilocularis, Molucella spinosa and Ornithogalum spp. - M.E.L. [32(569)]

1744. * GUZMAN, M.E. Uso de herbicidas en los cultivos, de zanahoria y chicharo en el Valle de Toluca. [Use of herbicides in carrots and chicory in the Valle de Toluca.] Mex.Agr.Tec.en Mex, 1959/60, 9,15.

1745. STETTMEIER, W. Chemische Unkrautbekämpfung in Pfefferminze-Kulturen. [Chemical weed control in peppermint.] Pflanzenschutz, 1959, 11,(11),164-5, (G.)
The Bavarian Institute for plant production and protection recommends chlorpropham, monuron 0.5 kg/ha and simazine 1.5 kg/ha at emergence. - Ref.Zh.Biol., 1960, 70908.

1746. GREAT BRITAIN. Growers show keen interest in herbicide advice. Grower, 1960, 54,(12),550.
Includes the information that: (1) during 2 years dinoseb (amine) 4 # a.e. has given good results as a late pre-em. treatment for runner beans; (2) chlorpropham 0.5-1 # pre-planting has given promising results on lettuce in cold frames if the soil is at field capacity before planting (so as to avoid early watering) and if ventilation is given; (3) spring sown Calendulas showed considerable tolerance of chlorpropham and substituted ureas at normal rates pre-em., while Gypsophila elegans was severely injured by chlorpropham and fenuron; (4) in dahlias 2,4-DES 4 # applied just after planting and a directed spray of cresylic acid when weeds were 2-3 in. tall were equally suitable in controlling weeds and giving high flower yields. - L.K. [O.W.]

1747. BIVINS, J.L. and HARVEY, W.A. (Agric.Ext.Serv.,Davis,Calif.,U.S.A.) Chemical weed control in azalea seed crop. Calif.Agric., 1960, 14,(8),14.
In replicated tests on 2-year-old azalea plants (vars. Redwing, Early Wonder, and Madam Mestdag) in raised beds of 90% peat and 10% wood shavings, neburon 2 # as a foliage spray and CDEC liquid (foliage spray) and granular 8 and 16 # gave good weed control for 4 months and neburon 4, 8 and 16 # gave season-long weed control. The weeds in the control included annual bluegrass [Poa annua], bitter cress [Barbarea vulgaris], yellow oxalis [Oxalis corniculata] and dandelion [Taraxacum officinale]. Neburon up to 8 # caused no injury to azaleas and at 16 # caused only some yellowing of the main veins of the leaves in var. Redwing. CDEC liquid severely burned var. Madam Mestdag but many plants recovered. No foliage burn resulted from the granular. - D.M.L.S. [O.W.]

1748. GERMANY. Einsatz von CMPP auch im Gartenbau möglich. [Mecoprop may also be used in horticulture.] Zbl.dtsch.Erwerbsgartenbau, 1959, (24),3.
Mecoprop controlled chickweed in gladioli 20 and 70 cm tall without crop injury. - Z.Pfl-Krankh., 67,306.

1749. SHIRAISI, Y. and DANBAYASHI, H. (Hyogo For.Exp.Sta.,Japan). The effect of weeding CIPC in the forest nursery. J.Jap.For.Soc., 1959, 41,(8),316-7, (Jap.), figs.
Chlorpropham was applied in early May and the effect was examined 30 and 70 days after application. The first examination showed that this chemical is effective. The most effective dose was 500 g/0.1 ha. The result of the second examination showed that the effect did not last to that time. No injury to Cryptomeria japonica was found. Herbicide effect was remarkable for Poaceae, Equisetum arvense, Sugina japonica, Veronica peregrina, Stellaria and Alsine. - Biol.Abstr., 35,(14), 39394.

1750. * FROMANTIN, J. Influence de l'acide 2,4,5-trichlorophenoxyacetique et de l'acide β-indoleacetique sur la germination et la croissance des plantules de quelques coniferes. [The effect of 2,4,5-T and β-indolylacetic acid on the germination and growth of some conifer seedlings.] Phyton, 1957, 9,(1),1-14.

1751. AREND, J.L. (Res.Cent.East Lansing, Michigan,U.S.A.) Airplane application of herbicides for releasing conifers. J.For., 1959, 57,(10),738,40,42,44-5,47-9, bibl.15.
A review on the use of aircraft in the United States from 1950 is followed by details of the

status of present knowledge, including information concerning herbicides and carriers to use, rate/ac, degree of control needed for release, and when to release in regard to stand development and physiological activity, type of aircraft to use, marking areas to be sprayed, aircraft operators' responsibility and wildlife considerations. - J.W.F.
[O.F.]

1752. BEAUFAIT, W.R. Studies of fire and other factors related to Jack Pine regeneration in northern lower Michigan. Ph.D.Thesis, Univ.Mich., 1960, pp.179, Microfilm $2.50, Xerox $8.20.
Jack pine (Pinus banksiana, Lamb.) cone scales were dissected and subjected to various temperatures and moisture conditions to demonstrate the mechanism of cone opening in nature and in fires. Mature cones were found to be at equilibrium with atmospheric moisture; they responded consistently by opening in a range of 80 seconds at 200°F and in 2 seconds at 1300°F. Cones which ignited retained no viable seeds while those which did not ignite suffered only slight reduction in the germinative capacity of their seeds.
Out of 14 tests of site scarification with slash scattering, only 3 of the 170 ac involved were found to be supporting as many as 1000 seedlings/ac. Seeds and seedlings were grown at 2 locations under 3 light conditions and on 3 soil treatments (scarified, burned and untreated) for 2 years. Analyses of variance of germination % and survival of over 10 000 seeds reaffirmed the superiority of mineral soil as a seed bed and the value of some protective shade to germinate seedlings. Burned seedbeds were not very different from untreated ones in their ability to favour both germination and survival. Second year survival ranged from 13.8 to 12.1% on scarified plots and from 1.0 to 6.9% on treated and burned plots, depending on degree of shade.
It was found that Jack pine slash burning can be safely carried out to produce the desired mineral soil exposure.
Two field tests of prescribed fire in cut over Jack pine were carried out in which phenotypically desirable seed trees were left standing; in 1 area, 19 seed trees dispersed an estimated 89 000 seeds after the fire and produced 450 seedlings/ac resulting in 18% stocking by mil-ac; on the other burn, 24 seed trees released 181 000 seeds which produced 1200 seedlings to results in 25% mil-ac stockings. These results were for 1 growing season only and it proved to be one of the driest on record. - From Diss. Abstr., 1960,20,(12),4478. - J.W.F.

1753. AUSTRALIA. Kill mistletoe (Amyema pendula). Rur.Res.C.S.I.R.O., Melbourne. 1959, (29),24-9, bibl.6.
Presents a nomogram and table for computing dosages (by reference to host species, d.b.h., and treatment period) for 8 Eucalyptus spp., using 2,4-D (triethanolamine salt) in shallow bare holes. Further tests are mentioned in which other substances and formulations, particularly the hydrazine salt of 2,4-D, showed promise. Axe cuts, though less effective than boreholes, were much faster, making the treatment of large areas possible. - J.W.F.
[140(94)]

1754. FLEMING, S.D. Chemical control of grass and weeds in sisal lands. Bull. Kenya Sisal Bd, 1959, 28,39-40, figs.2, tabs.2.
Gives recommendations for dalapon, TCA, monuron ± MCPA, and MCPA. - D.M.L.S.
[20(676.2/9)]

1756. SANDERS, M.B. and FLEMING, S.D. The use of herbicides to control grass and weeds in sisal lands. Bull.Kenya Sisal Bd, 1959, 29,40-2.
Digitaria scalarum was completely controlled by the following programme:- 1 ploughing in September-October, followed by disking in November-December and again in January. In March dalapon 15 # in 120 gal water was applied to the couch which was 6-8 in. high. The area was lightly disked 5 weeks later and the sisal planted 6 weeks later. Costs are detailed. In bulbil nurseries, an interval of 6 weeks between dalapon treatment and planting should likewise be allowed. "Soft weeds", which often become prolific after couch control with dalapon, can be controlled with MCPA or 2,4-D (amine); 2,4-D (ester) is toxic to young bulbils. - D.M.L.S.
[21(676.2/9)]

1756. HALL, I.V. (Plant Path.Lab., Kentville, Nova Scotia, Canada). Plant populations in blueberry stands developed from abandoned hayfields and woodlots. Ecology, 1959, 40,(4),742-3, tabs.1,bibl.3.
The blueberry fields studied had been in production 10 and 25 years. The weeds Dennstaedtia punctilobula, Pteridium aquilinum, Populus tremuloides, Betula populifolia, Cornus canadensis, and Rhododendron canadense in all predominantly woodland spp. - occurred in the fields recently developed from woodland. The weeds, Pyrus melanocarpa, Prunus pennsylvanica, and Kalmia angustifolia, occurred

in both types of the 10-year old stands but were more numerous in those developed from woodland. On the 25-year old fields K. angustifolia showed a marked increase. The 6 spp. most prevalent in fields developed from hayfields were: Polytrichum comune, Agrostis tenuis, Spiraea latifolia, Solidago rugosa and Hieracium pratense; of these the only serious weed is S. latifolia. D.M.L.S. [O.R.]

1757. CAMPION, R.C. (Dep.Agric., Brisbane, Queensland, Australia). Spraying weeds in pineapples. Qd agric.J., 1960, 86,(3), 181-4, figs.2.
Both dalapon and TCA are injurious to pineapples but may be used for grass control at the end of a crop cycle. Monuron 4 # and PCP 10 #, both in 200 gal water, and PCP-oil mixtures are recommended pre-em., and instructions are given for their use. - D.M.L.S. [O.P.E.]

1758. WEAVER, R.J. and McCUNE, S.B. (Univ.Calif., Davis, Calif., U.S.A.) Test for activity of plant growth-regulators on grapes. Bot.Gaz., 1959, 120,(3), 166-70, figs.2, tabs.3, bibl.4.
The effect of 2,4-D, 2,4,5-T, MCPB and 3,4-DA when applied as droplets or spray to vine shoots was assessed by observations and measurements on subsequent growth of the shoot. A method was developed for determining relative toxicity of this type of compound and investigating differences in varietal susceptibility. - K. Holly. [O.W.]

1759. LOEWEL, E.L. (Obstbauversuchsanstalt Jork., Hamburg, Germany). Unkrautbekämpfung und Bodenbearbeitung in unseren Junganlagen. [Weed control and cultivations in our new plantings.] Mitt.Obstbauversuchsring des alten Landes, 1959, 14,(10/11), 221-6, (G.), figs.7, bibl.1.
Total eradication of orchard weeds with early winter sprays is impossible, but loosening and weakening of stolons and roots paves the way for satisfactory cultivations in spring. The reaction of fruit-trees to the cultivations is most satisfactory; the scorching and yellowing of leaves appears immaterial. Experience has shown the most effective spray to be a mixture of simazine and amitrole (Domatol 371) at 5-10 kg/ha in 1200 l/ha. Even and thorough wetting of the soil is essential. Orchards sprayed in the late autumn of 1958, with the soil worked only twice in the dry summer of 1959, showed benefit, due to freedom from weeds rather than to a mechanical tilth production. Apples, pears, plums, and bush fruit (currants, gooseberries, raspberries) appear to benefit equally from applications of Domatol 371, as do strawberries; though here different strains show different reactions. A new Danish front-mounted cultivator which will cultivate between the trees in the rows as well as between rows of trees is of great help. - P.C. [235(43)]

## BIOLOGY OF WEEDS AND POISONING BY WEEDS

See also 1727, 1741, 1756, 1790, 1800, 1809, 1862.

1760. ROGERS, W.E. and NELSON, R.R. Studies on the translocation of minerals and carbon compounds between corn and Striga asiatica (Abstract). Proc.56th ann.Meet.N.Carolina Acad.Sci. [contained in] J.Elisha Mitchell sci.Soc., 1959, 75,(2),67.
Examination of Striga asiatica plants showed that phloem was well developed in the stems, but efforts to identify this tissue in the haustoria were inconclusive. Xylem tissue appeared to be the important means of connection between host and parasite. Radioisotopes of sulphur and phosphorous were translocated rapidly to the parasite when supplied to maize leaves or roots, and accumulated mainly in the leaves of the parasite. Carbon$^{14}$ applied as radioactive glucose to cut tips of maize leaves accumulated to a greater extent in S. asiatica than in maize roots; similar results were obtained with carbon dioxide. Further studies with carbon$^{14}$ indicated that S. asiatica was capable of photosynthesis. - Field Crop Abstr., 13,(3),1121.

1761. MURTHY, D.V. (Dep.Agric., Seshadri Road, Bangalore 1, India). Insects attacking Striga. Nature, 1960, 187,(4741),959, bibl.9.
The literature is reviewed and a brief account given of Smicronyx albovariegatus, a weevil which forms stem and root galls and also eats into the seed capsules. An investigation into the possible biological control of Striga is to be published shortly. Both Precis orithya swinhoe and S. albovariegatus check Striga growth in the field. - D.M.L.S. [O.W.]

1762. MALAYA. Cuscuta australis. A parasite of cover plants. R.R.I.Plant.Bull., 1960, 49.
C. australis, which is described, is the only Cuscuta sp. found in Malaya. It parasitises Mikania scandens, also desirable cover plants,

e.g. Calopogonium mucunoides and Pueraria phaseoloides. Eradication by hand or by non-selective weedkillers is advised. - D.M.L.S. [O.RE.]

1763. ALMEIDA, J.M. As "orobancas" comprometem a cultura de algumas leguminosas. [Broomrape hinders the growth of some legumes.] Agricultura, Lisboa, 1959, 3, 35-6.
Cultivated legumes are divided into 4 groups according to their susceptibility to Orobanche crenata. Vicia faba, V. narbonensis, Lathyrus sativus and Pisum sativum are highly susceptible. - Field Crop Abstr., 13, (3), 1250.

1764. DONINI, B. La germinazione dei semi di Orobanche ramosa L. Indipendentemente dalla presenza dell'ospite. [The germination of seeds of Orobanche ramosa L. in the absence of a host.] Agric. ital., 1959, 59, (6), 219-22, (It.).
Experiments with a number of amino acids showed that proline and ornithine caused germination. - Ref. Zh. Biol., 1960, 65778.

1765. GREAT BRITAIN. Rep. Rothamsted exp. Sta. 1959, 1960.
p.81. Wild oats. On plots at Rothamsted, ploughed after 4 years in ley, 0.6 Avena fatua seedlings/yd$^2$ appeared, compared with 1.2/yd$^2$ in 1958 ploughed after 3 years and 28.5/yd$^2$ at the beginning of the experiment. These plots were reploughed and seedlings counted in the second season after ploughing were found to have remained nearly constant at about 1/yd$^2$ for 1, 2 and 3 years under grass. In another area viable seeds of A. fatua and A. ludoviciana from a field under ley for 5.5 years showed no significant decrease in numbers since the previous year, the infestation being still about 5 million seeds/ac.
The germination behaviour of A. sterilis from Algeria, Malta, and Greece and of A. barbata from Malta is discussed, also the results of the identification of 289 wild oat seed samples from 7 European countries.
At 7°C, gibberellic acid did not affect A. ludoviciana germination, but at higher temperatures it was nearly as effective as pricking in breaking temperature-induced dormancy. Gibberellic acid solution was less effective when the seeds were soaked in it for less than 20 hours; 25 p.p.m. were as effective as 50 p.p.m. but lower concentrations were less effective.
Other weed spp. A 3 years' test has shown that Chrysanthemum segetum seeds germinate mainly in the period August to March. Seedlings of Chenopodium album can be distinguished from Atriplex patula seedlings by the colour of the backs of the cotyledons at emergence - mauve in C. album and green in A. patula. A. patula seeds germinated only in April and May; C. album germinated mainly in spring but also until August. Only 40% of A. patula seeds and 65% of C. album germinated in the first year.
Bartsia odontites [Odontites verna] was found (at Broadbalk) to be less abundant on plots which received nitrogen (N) than on plots where no N was given, probably because of increased competition from the crop. It was slightly more abundant in the first wheat crop after fallow than in subsequent crops, indicating that germination may be stimulated by presence of the crop, although Bartsia seeds will germinate in isolation on filter paper or in soil.
Soil samples from Section 1a of Broadbalk (continuous wheat with herbicidal weed control) and Section 1b (fallow cycle without herbicides) showed a reduction on 1a in the number of dicotyledonous weed seeds but some spp. including Alchemilla arvensis, Papaver spp. and Veronica arvensis were more abundant on 1a.
Weed competition. When grown in pots at 16 weed plants and 1 wheat or kale plant/pot, Chenopodium album, Polygonum aviculare and P. persicaria all, with low N supply, decreased leaf area and dry weight of both kale and wheat by ca. 40%. With high N supply they had less effect on kale than with low N supply but a much greater effect on wheat, decreasing leaf area and weight by 60%. Weeds usually affected stems less than leaves, except that with high N supply C. album decreased stem dry weight of wheat more than leaf weight so that in the presence of C. album wheat stem weight was less with high N than with low N supply. Competition with kale decreased the weights of weeds more than competition with wheat, and the effects of crop on weeds were similar at both rates of N. The results suggest that for kale competition with weeds for N was important but for wheat was subsidiary to some other factor. The difference in the effect of C. album on wheat stems from that of the Polygonum spp. was associated with lower shoot number and leaf N content in wheat plants grown with C. album, possibly due to greater shading from C. album causing a decrease in N assimilation by the wheat.
Competition between Agropyron repens and sugar beet. Yield data from pot trials

indicated that sugar beet and A. repens compete more for N than for potassium (K). Uptake of both N and K by sugar beet is decreases by competition with A. repens, the effect on N uptake being the greater; the decreased in both N and K uptake were greatest at the lowest rates of nutrient supply. All effects of treatments (3 rates of N in all combinations with 3 rates of K with and without A. repens) on growth, including those of competition could be related to differences in rates of N and K uptake. Apparently competition was acting solely through its effect on these rates, with competition for N having more effect than competition for K. There was evidence, however, that competition may decrease uptake of a given nutrient in other ways than by diminishing the amount of it in the soil, e.g. by depleting another nutrient that interacts with it.

Production of toxic substances by A. repens. Laboratory trials to determine whether toxin production occurs during decay of Agropyron residues in the soil are described. Incubation of plant material with poor oxygenation (high water content) produced extracts highly inhibitory to extension growth of rape, toxicity being greater after 22 days incubation than after 15 days. However, though extract from plant material incubated with only a small inoculum of soil was nearly as toxic as with a large amount of soil, soil alone incubated with citrate buffer at pH 5.1 was also slightly toxic, so that it is not clear whether acidity may be responsible. Extracts from preparations with better oxygenation (lower water content) during incubation had little or no effect on seedling growth. Field observations suggest that the amounts of root and rhizomes present in land heavily infested with A. repens are enough to affect crop growth by toxin production when they decay in suitable conditions, but this effect is probably not specific to Agropyron.

p.177. Simazine and atrazine in field beans and potatoes. In a preliminary trial with simazine 0.5, 1 and 1.5 # and atrazine 1 # applied pre-em. to tick beans drilled 3-4 in. deep and to potatoes, with no cultivations after spraying, bean yields were increased by controlling the weeds but there was an indication that the higher rates of simazine decreased yield. The optimum dose on a heavy soil seemed to be 0.5 # and on a light soil 1 #. Potato yields were increased by all treatments compared with the unweeded control but greater increases were obtained with mechanical cultivation which controlled Galium aparine whereas simazine and atrazine did not. When the same treatments were applied to winter beans 4-5 in. high in March, atrazine caused stunting and damage and reduced yield but simazine no visible damage and no yield decrease at the 2 lower rates. All treatments gave good control of Matricaria inodora and Polygonum persicaria. - D.M.L.S. [O.RE.]

1766. STEARNS, F. (Vicksburg Res.Cent., Mississippi, U.S.A.) Effects of seed environment during maturation on seedling growth. Ecology, 1960, 41,(1),221-2, tabs.1, bibl.8.

Plantago aristata seed matured at 80°F produced larger and more vigorous seedlings than seed matured at 60°F, while seed from 70°F produced seedlings of intermediate size. This relationship held whether seedlings were grown at 60° or at 80°F. Difference in leaf size and vigour persisted for 120 days. Root length, although not measured, appeared to be correlated with leaf size. Seed size and weight did not appear to be responsible for the differences in growth. - D.M.L.S. [O.R.]

1767. HARRIS, S.W. and MARSHALL, W.H. (Humboldt State Coll., Arcata, Calif., U.S.A.) Experimental germination of seed and establishment of seedlings of Paragmites communis. Ecology, 1960, 41,(2),395.

Small scale trials are described which showed that P. communis seed can be germinated experimentally. The establishment of P. communis seedlings in nature is also recorded. - D.M.L.S. [O.R.]

1768. COPPER, J.B., MAXWELL, T.L.Jr. and OWENS, A.D. (Agric.Exp.Sta., Clemson, S.Carolina, U.S.A.) A study of the passage of weed seeds through the digestive tract of the chicken. Poultry Sci., 1960, 39,(1),161-3, tabs.1, bibl.6.

Germination tests on faeces of White Leghorn hens given a seed free poultry feed to which a 100 seeds of a single weed variety were added showed that the viability of the seeds was destroyed in the intestinal tract. No seeds were detected in the faecal material. Seed species studied were Pojo [Diodera teres?], sticktight [Bidens cernua], coffeeweed [Cassia tora], corncockle [Agrostemma githago], jimson weed [Datura stramonium], morning glory [Ipomoea purpurea], cheat [Bromus secalinus], ironweed [Galeopsis tetrahit], ragweed [Ambrosia artemisiifolia], ladino clover [Trifolium sp.], Bermuda grass [Cynodon dactylon], dodder [Cuscuta sp.], crabgrass [Digitaria sp.], bitterweed [Helenium tenuifolium], dock [Rumex sp.], carpet grass [Axonopus sp.], dallas grass

[Paspalum dilatatum], crimson clover [Trifolium incarnatum], ryegrass [Lolium spp.] foxtail [Setaria sp.], cornflower [Centaurea cyanus], carrotweed [Daucus carota?], Johnson grass [Sorghum halepense], sesame [Sesamum sp.] and horsenettle [Solanum carolinense]. - M.E.L. [12(75.7)]

1769. BLEASDALE, J.K.A. and ROBERTS, H.A. (N.V.R.S., Wellesbourne, Warwick, England). The effects of different methods of seed-bed preparation on weed emergence. Rep.Nat.Veg. Res.Sta. 1959, 1960, 46-9, figs.1, tabs.2, bibl.3.

Disking only (or, in the third year, harrowing with pitch pole harrows) was compared with (1) disking + raking to simulate drag harrowing and (2) disking + rotovating to a depth of 4-5 in. followed by levelling with a rake. These operations produced 3 degrees of fineness of tilth, that from (2) being the finest and also tending to be fluffy. Half the plots were in addition rolled. Weed counts showed that weed numbers increased with increasing fineness of tilth and that there were greater numbers on plots that had been rolled. Some implications of these results, especially in relation to the use of pre-em. herbicides, are discussed. - D.M.L.S. [O.RE.]

1770. LI, MING-YU. An evaluation of the critical period and the effects of weed competition on corn and oats. Ph.D.Thesis, Univ. Rutgers, 1960, pp.166, Microfilm $2.50, Xerox $7.80.

When competing with weeds, oats were found to produce lower grain yield and dry matter yield, fewer tillers and seeds/panicle, and to have a lower nitrogen and potassium content than those free from weed competition. Increasing the fertility caused increases in both yield and nitrogen content of oats growing with weed competition to or above the level of a clean crop receiving no fertilizer.

A 12 in. weed free band in maize was not sufficient to offset the effects of weed competition. % nitrogen in maize plants was decreased when competition lasted longer than 3 weeks after emergence. Phosphorous, potassium and calcium contents were also affected by weed competition in some cases. The results indicated that it is possible to counteract weed competition in maize by an increase in fertilizer application under conditions where water is not a limiting factor. - From Diss.Abstr., 1960, 20, (11), 4226. - J.W.F.

1771. MINSHALL, W.H. (Pest.Res.Inst., Canadian Dep.Agric., London, Ontario, Canada). Effect of light on the extension growth of roots of frogbit. Canad.J.Bot., 1959, 37, 1134-6, bibl.2.

In experiments on young plants of Hydrocharis morsus-ranae consisting of 2 leaves and 2 roots, one 10-15 cm and one 2-5 cm in length, illuminated with 400ft-c of light in a non-aerated nutrient solution, exclusion of light from the roots for 48 hours resulted in 90% reduction of root extension growth; root growth which did occur in the dark was white or pale green in colour. This suggests that although the leaves can supply some energy for root growth, the main source is the photosynthetic assimilation of carbon by the green roots. - M.E.L. [232(71)]

1772. KLEBESADEL, L.J. and SMITH, D. (Dep.Agron., Univ.Wisconsin, U.S.A.) Light and soil moisture beneath several companion crops as related to the establishment of alfalfa and red clover. Bot.Gaz., 1959, 121, (1), 39-46, figs.2, tabs.3, bibl.13.

Assessment of weed growth formed a small part of this investigation. Growth of weeds was always least in association with the companion crops which caused the most shading and the greatest soil moisture stress. - K. Holly. [O.W.]

1773. KINCAID, D.R., HOLT, G.A., DALTON, P.D. and TIXIER, J.S. (Univ., Tucson, Arizona U.S.A.) The spread of Lehmann lovegrass as affected by mesquite and native perennial grasses. Ecology, 1959, 40, (4), 737-42, figs.5, tabs.1, bibl.8.

Conclusions reached from a trial in Arizona were:- (1) mesquite (Prosopis juliflora var. velutina) densities of 25 trees/ac or less do not significantly reduce Lehmann lovegrass (Eragrostis lehmanniana) establishment; (2) density of native grasses is adversely affected by even a few mesquite trees; it increased up to 75% where mesquite had been reduced from a dense stand to 25 trees/ac and was ca. twice as great in the plot with no mesquite as in that with 25 trees/ac; (3) reseeding an area cleared of mesquite with Lehmann lovegrass appears to be of little or no value if remnants of native grasses are present. - From Authors' Summary (modified). - D.M.L.S. [O.R.]

1774. EVANS, R.A. (U.S.Dep.Agric.,Reno, Nevada,U.S.A.) Differential responses of three species of the annual grassland type to plant competition and mineral nutrition. Ecology, 1960, 41,(2),305-10, figs.7, bibl.11.
The effects of intra- and interspecific competition at different levels of nitrogen (N) and phosphorous (P) among 3 Californian grasses (Bromus mollis, Erodium botrys and Festuca megalura) were studied in greenhouse pot trials. Results indicated that competition was effective through differences in N uptake by the constituent spp. With a high P level these differences resulted in changes in yield. With low P they were expressed as differences in N % and minimized yield changes. Factors of interspecific competition were differential shading and differential ability for N uptake. One was more important than the other depending on the sp. and sp. combination. - From Author's Summary (modified). - D.M.L.S. [O.R.]

1775. VANCE, B.D. and KUCERA, C.L. (Dep. Bot.,Univ.,Columbia,Missouri,U.S.A.) Flowering variations in Eupatorium rugosum. Ecology, 1960, 41,(2),340-5, tabs.2,bibl.13.
A study of wide-ranging collections under uniform conditions. - D.M.L.S. [O.R.]

1776. ZANZIBAR. Biological control of Lantana. E.Afr.Fmr & Planter, 1959, 4,(3), 25.
In Zanzibar, introductions of Teleonemia scrupulosa completely defoliated Lantana camara and spread slowly into areas adjacent to those into which it was introduced. Where L. camara was killed, the area was rapidly recolonized by Panicum trichocladum. - Field Crop Abstr., 13,(3),1453.

1777. BOWDEN, W.M. Chromosome numbers and taxonomic notes on northern grasses. III. Twenty-five genera. Canad.J.Bot., 1960, 38,(4),541-57, bibl.47.
The following spp. were included and their chromosome numbers recorded as follows: Agrostis canina 2n = 14; A. gigantea 2n = 42; A. palustris 2n = 30; A. perennans 2n = 42; A. scabra 2n = 42; A. tenuis 2n = 28, 32 and 34; Alopecurus aequalis 2n = 14; A. geniculatus 2n = 28; A. pratensis 2n = 28; Anthoxanthum odoratum 2n = 20; Calamagrostis canadensis 2n = 42 and 56; C. neglecta 2n = 28; C. pickeringii 2n = 28; Danthonia spicata 2n = 36; Deschampsia caespitosa 2n = 26, 27 and 28; D. flexuosa 2n = 28; Koeleria cristata 2n = 14; Nardus stricta 2n = 30; Oryzopsis asperifolia 2n = 48; Phalaris arundinacea 2n = 28; Phleum pratense 2n = 42; Sorghastrum nutans 2n = 40; Sporobolus cryptandrus 2n = 36; Trisetum spicatum 2n = 28; Taxonomic notes on these spp. were also included. - D.M.L.S. [O.R.]

1778. * GILLIS, W.T. Taxonomic problems in poison ivy. Mich.Acad.Sci.Arts & Let.Papers. 1960, 45,(1),27-34.

1779. CLIFFORD, H.T. On hybridization between Amaranthus dubius and A. spinosus in the vicinity of Ibadan, Nigeria. J.W.Afr.Sci. Ass., 1958, 4,(2),112-16, figs.1,tabs.3, bibl.6. [O.R.]

1780. KUHN, F. and UHRECKY, I. Vyskyt polnich plevelu na ruznych pudnich typech. [The occurrence of field weeds on different soil types.] Sborn.vys.Skol.Zemed.Lesn. Brne, 1959, 3,379-87, (Czechoslovakian.russ. g.)
Lists of weeds and weed associations characteristic of different soil types, such as podzols, saline soils, etc., are given in tabular form, and the weed populations are related to the pH, N content and tilth (Gare) of the habitat. - Soils & Fert., 23,(3),1341.

1781. BAKSHI, T.S. and COUPLAND, R.T. Vegetative propagation in Linaria vulgaris. Canad.J.Bot., 1960, 38,(2),243-9, figs.6, bibl.10.
Vegetative propagation in L. vulgaris is obtained by the development of numerous adventitious buds on its roots. Each bud originates exogenously on the parent root, and it is always associated with a lateral root which arises in the pericycle opposite a protoxylem point. Buds capable of vegetative propagation are not found on either the hypocotyl or the stem. This appears to be correlated with the absence in roots of the typical open type of lenticels and of any significant accumulation of starch. Soil disturbance seems to have a deleterious effect on the production of buds on roots. - Authors' Summary. [O.R.]

1782. TOWNSHEND, J.L. and DAVIDSON, T.R. (Dep.Agric.,St.Catharine's,Ontario,Canada). Some weed hosts of Pratylenchus penetrans in Premier strawberry plantations. Canad.J.Bot., 1960, 38,(3),267-73, tabs.1,bibl.16.
A list is given of 55 weed spp. and 7 cultivated plant spp. which were collected from

root rot areas in strawberry plantations and found to be infected with P. penetrans; 63% of the weeds belonged to the Compositae and Cruciferae. Perennial plant spp. with soft-textured roots contained larger populations of P. penetrans and had more extensive root necrosis than spp. with hard-textured roots. - Partly from Authors' Summary. - D.M.L.S. [O.R.]

1783. INDIA. New use for Argemone. Indian Fmg, 1960, 10,(1),19.
Alkaline land has yielded exceptionally good paddy crops after being fertilised with dried and powdered Argemone sp. mixed with irrigation water. Experiments on its utilization are continuing. - D.M.L.S. [O.RE.]

1784. MITCHELL, W.D. (Dep.Agric.,Brisbane, Queensland,Australia). Weed taints in dairy produce. Qd agric.J., 1960, 86,(3),148.
The following weeds cause taints in dairy produce:- bitter cress [Coronopus didymus], pepper cress [Lepidium hyssopifolium], slender celery [Apium leptophyllum], turnip weed [Rapistrum rugosum], turkey berry, and fishweed [Chenopodium trigonon]. - D.M.L.S. [O.RE.]

1785. FRASER, C.M. and NELSON, J. Sweet clover poisoning in newborn calves. J.Amer. vet.med.Ass., 1959, 135,283-6.
A condition is described in which apparently normal calves died of a haemorrhagic diathesis within a few hours of birth; the dams and the rest of the herd were unaffected. The condition is believed to have been sweet clover disease. [The evidence in support of this diagnosis is not very convincing]. - Vet. Bull.,Weybridge, 30,(2),93.

1786. COMPERE, R. (Sta.rech.agron.INEAC, Mulungu-Tshibinda,Belgian Congo). Etude toxicologique de Leucaena glauca chez les bovins. [Toxicity of Leucaena glauca for cattle.] Bull.agric.Congo belge, 1959, 8,(5), 1311-20, (F.flem.), bibl.3.
A bull was fed solely on L. glauca for 75 days when the experiment was terminated owing to the bad state of the animal. The symptoms of toxicity and P.M. findings are described. - From Vet.Bull.,Weybridge, 30,(3),147. - D.M.L.S.

1787. AUSTRALIA. Poisonous plants kill stock. Qd agric.J., 1960, 86,(4),244.
Trachymene glaucifolia is suspected of being responsible for a disease in stock of which the symptoms are either a heart condition or skeletal malformation. However, feeding trials to date have not given conclusive results. - D.M.L.S. [O.RE.]

1788. KINGSBURY, J.M. Toxicity of Apocynum (dogbane) to stock: a correction. Cornell Vet., 1959, 49,285-7.
Owing to confusion with Nerium (oleander), also belonging to the Apocynaceae, dogbane has been wrongly incriminated for poisoning livestock. All undocumented information on the toxicity of Apocynum appearing since 1922 should be discounted. - From Vet.Bull.,Weybridge, 30,(1),42. - D.M.L.S.

1789. DYBING, O. and ERICHSEN, S. Liver changes in rats after administration of Senecio aquaticus. Acta path.microbiol. scand., 1959, 47,1-8.
Male rats fed on a diet containing 1% dried Senecio died after 7-9 months with severe liver lesions. - From Vet. Bull., 30,(2),93. - D.M.L.S.

## AQUATIC AND WOODY WEEDS AND THEIR CONTROL

See also 1811, 1837.

1790. GRIST, D.H. Rice. Longmans, 1959, pp.466.
p.273. Water hyacinth [Eichhornia crassipes] is very susceptible to Corticium sasakii and may serve as an important source of infection to crops such as rice, sweet potatoes and groundnuts. - L.K. [O.RE.]

1791. * HAMILTON, J. Swamp vegetation controlled by chemical spray. For.Thesis, Montana State Univ., 1955.

1792. * CLEMARES MIRALLES, E. Las algas de los estanques y regadios. [Algae in pools and irrigated ares.] Cult.Mod., 1959, 42,(9),339.

1793. * BURT, E.O. Review of literature on brush control. Tech.Note Fla Univ., 1957, 1,pp.46.

1794. STEINHAUER, C. (E.I.du Pont de Nemours & Co.Inc., Charlotte, N.Carolina, U.S.A.) Chemical brush control. Proc. Nat.Shade Tree Conf., 1958, 34, 119-24.
A general article on the control of brush on power lines, telephone, railway and highway rights of way includes the information that trichlorobenzoic acid will control the following species:- spruce [Picea spp.], balsam fir [Abies balsamea], cedar [Cedrus spp.], pine [Pinus spp.], wild roses [Rosa spp.], sumac [Rhus copallina], persimmon [Diospyros spp.], sassafras [Sassafras spp.], hackberry [Celtis occidentalis], cowitch vine, trumpet vine [Eupatorium maculatum?], honeysuckle [Lonicera spp.] and smilax [Smilax spp.]. The use of monuron and fenuron is mentioned. - J.W.F. [O.F.]

1795. * HENRY, N.B. Some aspects of the use of 2,4,5-T in the thinning of young blackbutt (Euc. pilularis) regeneration. Qd For.Serv.Res.Notes, 1959, 7, pp.26.

1796. STRANG, R.M. (Rhodesia Wattle Co.Ltd.) An experiment in bush eradication. Rhod.agric.J., 1960, 57, (2), 122-3, figs.2, tabs.3.
In a trial in "msasa" forest where the principal spp. which averaged 6 in. d.b.h. were Brachystegia spiciformis and Pariniari curatellaefolia with some Napaea kirkii and Pterocarpus angolensis, results 4 years after treatment showed that AMS crystals 3 and 4 lb/gal water in frills has obtained the best kills (90 and 92.5% respectively) and 2,4,5-T 0.16 lb/gal diesoline in frills the next best (89.4%). Less effective in decreasing order of efficiency were: 2,4-D 0.16 lb/gal diesoline in frills, AMS crystals 2 lb/gal water in frills, 2,4,5-T 0.16 lb/gal diesoline on basal bark, frilling only, AMS crystals in cuts in the bark at 4 in. intervals at 1 teaspoonful/in. diameter, power parraffin on basal bark, and 2,4-D 0.16 lb/gal diesoline on basal bark. - D.M.L.S. [O.RE.]

1797. JOVANOVIC, S. Unistavanje kupine (Rubus caesius L.) i bagremca (Amorpha fruticosa L.) in populikalturi herbicidima. [Herbicidal control of brambles (Rubus caesius L.) and Amorpha fruticosa L. in poplars.] Zastita bilja, 1959, (54), 53-67, (e.), tabs.1, bibl.9.
Gives recommendations for the control of Rubus caesius and Amorpha fruticosa by MCPA, 2,4-D and/or 2,4,5-T, PCP, TCA and arsenicals. - From Author's Summary. - L.K. [67(497.1)]

1798. MEADE, F.M. Brush control with a tree injector. Arkans.Fm Res., 1960, 9, (3), 11, figs.1, tabs.2.
The injector is illustrated and the method of use described. In a trial using the injector with 2,4,5-T (low volatile ester) at 2.5, 5 and 10% in water and diesel oil, the 10% in diesel oil gave the best result and showed the following % kills after 2 growing seasons:- red oak [Quercus borealis] 89, blackjack oak [Q. marylandica] and white oak [Q. alba] 100, post oak [Q. stellata] 98, hickory [Carya sp.] 100, blackgum [Nyssa sylvatica] 67, and dogwood [Cornus sp.] 92. October was the best treatment time and early May the worst. - D.M.L.S. [O.W.]

1799. RHODESIA. Control of weeds and poisonous plants. Rhod.agric.J., 1960, 57, (2), 146.
Recommends, for the control of Lantana camara, either 2,4,5-T 2 % in 100 gal diesel oil applied when in full leaf, or 2,4,5-T 0.5 % + 2,4-D 1 % in 100 gal water applied to regrowth after cutting down. - D.M.L.S. [O.RE.]

1800. GODMAN, R.M. and KREFTING, L.W. Factors important to yellow birch establishment in Upper Michigan. Ecology, 1960, 41, (1), 18-28, figs.10, tabs.6, bibl.27.
All seed-bearing trees except yellow birch and a few white pine and hemlock were cut during the winter of 1952-3 and the area disked in the autumn of 1953. Of the various factors affecting the early growth of yellow birch which were studied during the 4 growing seasons of 1954-7, competition from shrubs caused much mortality and rapid disappearance of favourable seedbed conditions. Blackberry and raspberry bushes invaded the area within 3 years and suppressed and smothered many birch seedlings. The rate of invasion was partially correlated with the amount of scarification. Competition of tree spp. was of less importance. Red maple sprouts were the most competitive. Seedlings of red maple and other spp. were not strong competitors. - Partly from Authors' Summary. - D.M.L.S. [O.R.]

1801. MOSS, G.R. (Dep.Agric., New Plymouth New Zealand). Gorse. A weed problem on thousands of acres of farm land. N.Z.J.Agric., 1960, 100, (6), 561-7, figs.6.
Discusses the various methods of seed dispersal, the effectiveness of Apion ulicis in

destroying the seed, seed dormancy and viability, and control by burning, stock and 2,4,5-T. - D.M.L.S. [O.RE.]

1802. EVERIST, S.L. (Dep.Agric.,Brisbane, Queensland,Australia). Take a look at yellow-berry! Qd agric.J., 1960, 86,(3),172-3, figs.2.
Rubus ellipticus has been recently declared noxious in Queensland. It is described and illustrated and its distribution in Queensland detailed. It is easily killed by 2,4,5-T (40%) 1:400 in water, sprayed until the bushes are wet, or with a 2,4,5-T/2,4-D mixture 1:200. Grass should be planted when the bushes are dead. The sprayed bushes should not be burnt until at least 6 months after treatment. - D.M.L.S. [O.RE.]

## OTHER WEEDS AND THEIR CONTROL

See also 1711,1714,1719,1727,1729,1731, 1735,1739,1742,1749,1753,1761,1765,1857.

1803. HAMILTON, K.C., ARLE, H.F. and McRAE, G.N. (Arizona Agric.Exp.Sta.,Tucson, Arizona,U.S.A.) Control and identification of crop weeds in southern Arizona. Bull. Ariz.agric.Exp.Sta., 1960, 296,pp.67, figs.24.
This bulletin reviews the classification of weeds and their control by cultural, biological and chemical means. Illustrated descriptions are given of the major weeds of Arizona, with a brief note on the laws relating to weeds in this State. - P.J.B. [W2(79.1)]

1804. MEADLY, G.R.W. (Dep.Agric.,Perth, W.Australia). Weeds of Western Australia. Afghan thistle (Solanum hystrix R.Br.) J.Agric.W.Aust., 1960, 1(IV),(5),401-2,figs.1.
S. hystrix is a perennial which grows in colonies joined by rhizomes. It is described and illustrated. It is difficult to eradicate but has been controlled by cultivation to a depth of 4-5 in. using a scarifier with 8 in. point in late October or November when new growth is beginning. This is repeated when necessary and no flowering allowed. It is relatively resistant to growth regulating herbicides but some success has been obtained with 2,4-D (ester) 2 # applied in spring to new growth. By either method eradication may take several years. Small patches can be destroyed by grubbing. - D.M.L.S. [O.RE.]

1805. MATTHEWS, L.J. (Dep.Agric., Wellington,New Zealand). Weed identification and control. Nodding thistle. N.Z.J. Agric., 1960, 100,(4),329, figs.1.
Gives description and illustration of nodding thistle [Carduus nutans] and recommendations for its control with MCPA and 2,4-D salts and amines and MCPB and 2,4-DB, all at up to 1 # for seedlings. At the flower head stage it may be controlled by 2,4-D emulsifiable esters up to 2 # but not by MCPB or 2,4-DB. In lucerne 2,4-DB has given adequate control at the seedling stage in the absence of lucerne foliage. Pre-em. applications of chlorpropham and CDEC in onions and carrots are ineffectual. - D.M.L.S. [O.RE.]

1806. * AMARAL, J.K. and CARVALHO, L.R. Field thistle (Eryngium) and its chemical control. Lav.Arroz., 1960, 14,(157),23, 25-6, (Portuguese).

1807. * de ALMEIDA, J.M. [The "Orobanches" endanger the culture of some legumes.] Agricultura,Lisboa, 1959, 3,35-6, (Portuguese).

1808. AUSTRALIA. Control the spread of galvanised burr. Australas.Irrigr, 1959 4,(12),23.
Galvanised burr [Bassia burchii] is fairly widespread in central and northwest New South Wales and is spreading rapidly in some areas. One important method of spread is by sheep movement. Control methods include: cutting, stacking and burning; ploughing; the use of a road grader or dragging a log, rail, roller, or heavy chain. 2,4-D (ester) 3 # during active growth, or 0.2% for spot spraying, is recommended, but spraying of large areas is uneconomic. - D.M.L.S. [G.R.I.]

1809. RICHTER, W. (Inst.Grünlandschädlinge Oldenburg,Germany). Uber ein Massenauftreten des Giftahnenfusses (Ranunculus scleratus L.) in Ostfriesland und Versuche zur Bekämpfung des Unkrautes mit Wuchsstoffherbiziden. [A mass appearance of celery-leaved crowfoot (Ranunculus scleratus L.) in East Friesia and experiments on its control with growth regulators. NachrBl.dtsch.PflSchDienst, Braunschweig, 1960, 12,(9),138-40, (G.e.), figs.3,tabs.2,bibl.5.

R. scleratus is favoured by wet conditions and salt; hence, it thrives in areas subject to inundation by salt water. In 1959, a very dry year, a heavy infestation disappeared; it has been suggested that the species tends inherently to fluctuate widely. Plants have been found to produce well over 50 000 seeds each and germination is ca. 100%; a salt concentration of 3.5% decreased germination to 48%. Treatment in late November when young plants were in the rosette stage showed MCPA and 2,4-D to be very effective, MCPB less effective and mecoprop least effective. Treatment in late May of 1959 with 2,4-D gave poor results. - L.K. [O.W.]

1810. HANF, M. (B.A.S.F., Limburgerhof, Germany). Chemische Unkrautbekämpfung in Rüben. [Chemical weed control in beet.] Mitt.PflSch., 1960, pp.4, also in Mitt.dtsch. LandwGes., 1960, (8), (G.).

The activity on weeds of HS 55 [N-cyclooctyl-N'N'-dimethylurea + butinol-N-(3-chlorophenyl)carbamate] is given as: very active - Ackersenf [Sinapis arvensis], Hederich [Raphanus raphanistrum], Melde [Atriplex sp.], Gänsefuss [Chenopodium album], Kamille [Matricaria spp.], Knöterich [Polygonum spp.], Vogelmiere [Stellaria media], Hirtentäschelkraut [Capsella bursa pastoris], Kleine Brennessel [Urtica urens], einjährige Gräser [annual grasses]; active - Franzosenkraut [Galinsoga parviflora], Kreuzkraut [Senecio sp.], Hellerkraut, Erdrauch [Fumaria officinalis] and Mohn [Papaver sp.]; slightly active - Taubnessel [Lamium spp.], Ackerhohlzahn [Galeopsis sp.], Ehrenpreis [Veronica sp.], lebkraut [Galium aparine], Gänsedistel [Sonchus sp.], and Wicken [Vicia sp.]; inactive - "root weeds" and deeply germinating weeds. - L.K. [B.A.S.F.]

1811. UNITED STATES. (Amchem Products Inc., Ambler, Pennsylvania, U.S.A.) Amizine and other amitrol-simazine combinations for weed control in woody plants. Amchem Tech. Serv.Data Sheet, 1960, H-80, pp.8, tabs.4, bibl.5.

% Weed control in August following May treatments of Taxus, Juniperus and Thuja liner stock was Amizine 8 # (amitrole 2 # + simazine 6 #) 95%, amiben 8 #, 60% and fenac 6 #, 60% (20-30% foliage damage). Amizine 8 # in April gave 90% weed control in August in Pieris (slight discoloration), Buxus, Euonymus, Ilex (slight discoloration in Ilex convexa), Juniperus, Magnolia, Taxus, Thuja and Viburnum spp. Amizine 8 # in June controlled Solidago spp., Rubus spp., Barbarea vulgaris, Portulaca oleracea, Poa spp., Andropogon virginicus (50%), Digitaria sanguinalis and Setaria spp. without damage to Pinus sylvestris and Pinus nigra 4-8 ft tall. Amizine 1 # in April gave good control in August of vegetation including Agropyron repens, Phleum pratense, bramble [Rubus spp.], Plantago major, Viola spp., Ambrosia artemisiifolia, lambsquarters [Chenopodium album] and Allium vineale without injury to Pinus virginiana, P. strobus, Cornus florida, Prunus persica, Pyrus malus and Pyracantha spp.

In median strip plantings the % weed control in November following January treatments was Amizine 4 # 80%, amitrole 2 # 30%, and amitrole-T [amitrole + ammonium thiocyanate] 4 # 70% without damage to Juniperus spp., Pyracantha spp., Pinus ponderosa, Nerium oleander, Euonymus spp. (foliage 10% chlorotic with amitrole) and Ceanothus spp. (foliage 10% chlorotic with amitrole). Amizine 4 # in May caused no significant injury to Rosa multiflora and Crataegus spp. Preliminary tests for weed control by Amizine in forest plantations are described. - M.E.L. [O.W.]

1812. FRÖCHLING. Franzosenkrautbekämpfung in Hackfrüchten. [Control of gallant soldier in horticultural crops.] Hann.Land-u.Forstw. Ztg, 1959, 112, 80-2.

Galinsoga sp. germinates only at high temperatures, i.e. normally after crops have closed up. Simazine at half the normal rate sprayed beneath the crop canopy controlled the weed without injuring beet (the full rate was injurious). Successful results were also obtained in potatoes after the last earthing up. - From Z.PflKrankh., 66, 611. - L.K.

1813. JOHNSON, C. (Farm Advisor, Madera County, Calif., U.S.A.) Weeder geese in commercial fields. Calif.Agric., 1960, 14, (8), 5.

An account is given of their use in California. From 175 000-200 000 are used in the State each year, mostly in cotton but also in vineyards, sugar beet, castor beans, strawberries, melons, seed alfalfa, nursery crops, beans, hops, asparagus, potatoes, onions and to control grass weeds in irrigation ditches. White Chinese have been found to be the most effective breed and young geese are better weeders than old. In very weedy fields 3-5 geese/ac are required; this can generally be reduced to 1-2/ac after the first year. Geese should be introduced when the weeds begin to sprout and removed from the field after the last irrigation when the crops begin to mature. - D.M.L.S. [O.W.]

1814. BIESKE, G.C. Gambia pea (Crotalaria goreensis) control. Cane Gr. quart. Bull., 1959, 23,(2),52.
Crotalaria goreensis has been readily controlled by 2,4,5-T (ester) 0.5 #. 2,4-D even at 4 # was less effective. Application in March when older plants and young seedlings may be treated at the same time is recommended. - L.K. [139(94)]

1815. GREENHAM, C.G. and BROWN, A.G. (Div. Plant Ind., C.S.I.R.O., Canberra, Australia). Mistletoe control. J.Aust.Inst.agric.Sci., 1959, 25,(1),73.
The unfavourable control of mistletoe (Amyema miquelii) described by D. Hartigan (J.Aust.Inst.agric.Sci., 24,361-2, Weed Abstr., 8,562) using the method of Greenham and Brown (J.Aust.Inst.agric.Sci., 23,308-18, Weed Abstr., 7,954) for A. pendula are explained by:- use of different rate of 2,4-D; injection into 4 holes 3 in. deep rather than 1 shallow hole/in. of tree d.b.h.; earlier assessment (12 months or less) of mistletoe response; excessive soil moisture at time of application and different host species. - M.E.L. [138(94)]

1816. * BARTENS, E. Viscum album - die Mistel. [Viscum album - mistletoe.] Deut. Gart., 1959, 70,(4),88-90.

1817. * COOPER, R.F.V. Control del calvel del aire con verde de paris. [Control of Tillandsia species with Paris green.] Soc. Argentina de Hort.B., 1959, 17,(114),67-9. (Tillandsia spp.).

1818. MONI, N.S. and GEORGE, M.P. (Agric. Coll., Vellayani, India). Eupatorium odoratum - a common weed found in the teak plantations of Kerala State. Indian For., 1959, 85,(12), 728-30.
Some success in eradication was achieved by cutting the weed and the 3-4 year old teak plants and burning the whole area; coppice shoots of teak grow to a height of 6-7 ft during the first year and as the crowns become established the weed dies due to shading. As this method of control is quite costly, an economical way of using the weed was sought. An acre of the weed was found to yield 25 000 lb green matter/cutting and could be expected to give 2 cuttings/year. By means of cottage industry the following plant food constituents can be extracted from 1 acre of E. odoratum - Nitrogen 200 lb, phosphoric acid 100 lb, potash 200 lb and CaO 125 lb; in addition dicalcic phosphates can be extracted and used as cattle feed. - J.W.F. [O.F.]

1819. MUKULA, J. (Dep. Plant Husbandry, Agric.Res.Cent., Tikkurila, Finland). Amitrolin (Weedazol) Käyttömahdollisuuksista Juuririkkaruohojen torjunassa. [Effect of amitrole (Weedazol) on perennial weeds.] Maatalous ja Katim, 1960, 14,213-8.
The effects of amitrole were studied 1956-9, with special reference to Agropyron repens, Cirsium arvense, Equisetum palustre, Aegopodium podagraria and Pteridium aquilinum. Cultivation 1-4 weeks after treatment decreased the efficacy on Agropyron; when left, first growth reappeared in 2-3 months for Agropyron and after 1 year for Cirsium, Aegopodium and Equisetum. - From Author's Summary. - P.C. [15(471]

1820. GREAT BRITAIN. Grants for eradication of bracken. Leafl. Min. Agric. Fish. Fd, 1959, (amended), pp.2.
Gives details of conditions and amounts. - D.M.L.S. [418(42)]

1821. GREAT BRITAIN. Bracken beater - and the stock rate is doubled. Furs' Weekly, 1960, 53,(10),50.
An account of how a Welsh farmer doubled his stock rate by ploughing, disking, and rolling bracken-infested land and then fertilising and seeding with 32 # grass seed and 3-4 # rape. - D.M.L.S. [O.W.]

1822. ZOMOSA, E.W. (E.I.du Pont de Nemours, Wilmington 98, Delaware, U.S.A.) The use of monuron and diuron for the control of weeds in sugar cane. Agric.Vet.Chemic., 1960, 1,(2),97-100, figs.3.
Includes the information that diuron 4 # controlled Rottboelia exaltata. - L.K. [O.W.]

1823. UNITED STATES. DAC-893 Experimental pre-em. herbicide. Progress report on DAC-893 a pre-emergence herbicide. Dacthal (DAC-893) experimental pre-emergence herbicide. Data Sheets Diamond Alkali Co., 1958, pp.4; 1959, pp.6; 1960, pp.4.
Dacthal is the dimethyl ester of tetrachloroterephthalic acid. The pure compound is white crystalline, odourless, with a low vapour pressur and a melting point of 156°C. Water solubility is <0.5 p.p.m. and it is sparingly soluble in acetone, benzene, cyclohexanones dioxane, tetrahydro-

furan, xylene and petroleum derived solvents. The compound appears to be stable. The acute oral LD 50 to rats is > 3 g/kg; the acute dermal LD 50 to rabbits > 10 g/kg; 3 mg applied to a rabbit's eye caused only temporary, mild irritation. The compound has appreciable activity only when applied before emergence. In preliminary tests, soil moisture, depth of weed seeds (from 0.5-2 in.) had little influence on its activity, while high soil organic matter reduced it greatly. The compound which is available as a 50% wettable powder and as 1.5 or 5% granules is thought to be particularly promising for the control of crabgrass [Digitaria spp.]. Weeds susceptible to 4-8 # are D. sanguinalis, D. ischaemum, Chenopodium album, Eragrostis cilianensis, Erodium cicutarium, Mollugo verticillata, Panicum dichotaniflorum, P. capillare, Portulaca oleracea, Richardia scabra, Setaria lutescens, S. viridis and Stellaria media. At 4-8 # variable results have been obtained on Amaranthus retroflexus, A. spinosus, Echinochloa crusgalli, Eleusine indica, Euphorbia supina, E. maculata, Poa annua and Sorghum halepense, while the following have been found to be resistant: Abutilon theophrasti, Ambrosia artemisiifolia, Avena fatua, Brassica kaber, B. nigra, B. rapa, Bromus secalinus, B. tectorum, Datura stramonium, Galinsoga sp., Polygonum pensylvanicum and P. persicaria. The germination of turf grasses may be affected for 2 months after application. Promising results have been obtained in tomatoes (especially transplants), cole crops, snap and lima beans, potatoes and sweet potatoes, peas, peppers, onions, strawberries, lucerne, red clover, cotton, peanuts, soybeans, oats and wheat at 4-12 #. Beets, spinach, lettuce and millet (Setaria viridis) appear to be sensitive. Good results have also been obtained in established ornamentals. - L.K. [O.W.]

1824. TRIST, P.J.O. Protective flora of sea walls. Agriculture, Lond., 1960, 67,(4),228-31.
The author considers that Agropyron pungens is the best grass for sea walls. Beta maritima can be a particularly serious weed as its root growth can make conditions favourable for erosion. In 1958 (a wet year) early June spraying with MCPA, MCPB, mecoprop and 2,4-D (ester) was ineffective on Beta, while 2,4-D (acid in oil) was effective. In 1959 (a very dry year) 2,4-D (acid in oil) was less effective and injured Agropyron; 2,4-D 2 + 2,4,5-T 1 # and amitrol 4 # were effective but were injurious or lethal to Agropyron, while MCPA 2 # gave complete and selective control. - L.K. [O.W.]

1825. GREAT BRITAIN. Oats - wild and unwanted. Fmr & Stk-Breed., 1960, 74,(3688), 73, figs.1.
Burning cereal straw and no stubble cultivation until the autumn ploughing has given up to 60% control of wild oats [Avena fatua]. - L.K. [O.W.]

## CHEMISTRY, PHYSICS, TOXICOLOGY, RESIDUES AND SOILS

See also 1740,1823,1857.

1826. MARTIN, F. and PALLIERE, M. (Soc. Usines Chim.,Rhone-Poulenc,France). Acide methylchlorophenoxyacetique. Separation chromatographique des isomeres et acides voisins. [Methyl chlorophenoxyacetic acid. The chromatographic separation of isomers and related acids.] Bull.Soc.chim.Fr., 1960, (2), 375-7, (F.), figs.2,bibl.3.
The method described, which consists of repeated eluting, has an accuracy of ± 2% of the main constituent. - From Authors' Summary. - L.K. [O.R.]

1827. HAMMOND, H. (State Labs.Dep.Bismark, N.Dakota,U.S.A.) Herbicides: ester and amine salt of 2,4-dichlorophenoxyacetic acid, sodium and dalapon. J.Ass.off.agric.Chem.Wash., 1960, 43,(2),382-6, tabs.4.
Results of the following estimations carried out by independent collaborators were compared:- (1) estimation of total chlorine in ester and amine salt formulations of 2,4-D; results from 5 collaborators showed reasonably good agreement; the use of isopropyl alcohol as an accelerator in the ester estimation was recommended; (2) estimation of 2,4,5-T (sodium) by Dow Chemical Co. method (Anal.Chem., 27, 1774); 5 collaborators gave results in good agreement; it was found that 1 hour's boiling was not always sufficient for a high recovery and 1.5 hours might be necessary; (3) Estimation of dalapon by Dow Chemical Co. method (Anal.Chem.,31,418); results of 4 workers were in good agreement and the method was found to be reasonably specific for dalapon. - M.E.L. [O.R.]

1828. ARMAREGO, W.L.F. (Dep.Med.Chem., Nat.Univ.,Canberra,Australia). New derivatives of 2,4-dichlorophenoxyacetic acid. Paper read to A.N.Z.A.A.S., 1959(?) pp.9.
Lists a series of 2,4-D derivatives of varying chemical and physical properties synthesised in an attempt to obtain compounds with improved biological selectivity and activity against normally resistant plants. The methods of synthesis and products obtained are discussed. The derivatives included esters, ketones, amides, nitriles, thioureas and condensation products containing heterocyclic ring systems. Derivatives of 2,4-D-1-$C^{14}$ and 2,4-D-2-$C^{14}$ were prepared for the purpose of correlating biological activity with translocation. - M.E.L. [137(94)]

1829. HARRIS, T.H. (U.S.Dep.Agric.,Wash. 25 D.C.,U.S.A.) Report on analytical methods for pesticides. J.Ass.off.agric.Chem. Wash., 1960, 43,(2),340-2.
This report by the General Referee on Pesticides presented at the 1959 meeting of the A.O.A.C. includes the recommendation that isopropyl alcohol be used as an accelerator in the determination of the total chlorine in 2,4-D and 2,4,5-T. - L.K. [O.R.]

1830. BOTTINI, E. and SAPETTI, C. [The absorption spectra - a modern method of testing pesticides.] Ann.Sper.Agrar., 1958, 12,77-110.
Includes data on the infra-red and ultraviolet absorption spectra of various formulations of 2,4-D (salts) and dinoseb (triethanolamine). - From Chem.Zbl., 131, 4648. - L.K.

1831. McKINLEY, W.P. and MAHON, J.H. (Dep.Nat.Health,Ottawa,Canada). Identification of pesticide residues in extracts of fruits, vegetables and animal fats. I. Chromatography. J.Ass.off.agric.Chem.Wash., 1959, 42,(4),725-34, figs.3,tabs.1,bibl.13.
A method of extraction, separation and identification of pesticide residues from fruits, vegetables and animal fats using chromatographic techniques is described. Rx values, using lindane as standard, of 52 pesticides are given for the following partition systems:- (1) a. (immobile) 2-phenoxyethanol; b. (mobile) 2,2,4-trimethylpentane; (2) a. liquid paraffin, 4% v/v in ethyl ether; b. aqueous pyridine 40% v/v; (3) a. liquid paraffin 2% v/v in ethyl ether; b. 70% v/v aqueous acetone. The pesticides studied included Chlordane (2,3,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-9,7-methanoindene) dinoseb, diuron, monuron, CDAA 2,4,5-TP, 2,4-D, 2,4,5-T and MH. - M.E.L. [O.R.]

1832. RAGAB, M.T.H. Part I. Colorimetric methods for the determination of 2-chloro-4,6-bis(ethylamino)-1,3,5-triazine (simazine) and related compounds. Part II. Degradation of $C^{14}$ labeled simazine [2-chloro-4,6-bis (ethylamino)-1,3,5-triazine] by plants and soil microorganisms. Ph.D.Thesis, Univ. Illinois, 1959, pp.115, Microfilm $2.50, Xerox $5.60.
I. The author describes 4 sensitive, rapid, and reproducible methods for the colorimetric determination of simazine which are based on the splitting of the pyridine ring by simazine in the Zincke reaction, and condensation of the glutaconic dialdehyde formed with organic compounds containing active methylene groups.
Simazine with pyridine in the presence of alkali gave an intensely yellow colour with maximum absorbance at 436.5 mμ. Addition of ethyl cyanoacetate to the yellow colour as soon as it was formed gave a more stable pink colour absorbing maximally at 555 mμ. Destroying the yellow colour by acetic acid and then adding barbituric acid gave reddish-violet or blue colour with respective absorption maxima of 582 and 625 mμ.
II. Sweet corn and cucumber seedlings in 2 enclosed chambers were treated with 10 μc simazine-2,4,6-$C^{14}$. Expired $C^{14}O_2$ from these plants was collected and counted as barium carbonate in gel scintillator with a scintillation counter. Radioactivity from the cucumber on a dry-weight basis was initially much higher than that from sweet corn, but decreased with toxicity. Plant parts were extracted twice with chloroform and once with water. The data in liquid scintillator showed more activity in roots than in leaves and stems, and more activity from cucumber extracts than from sweet corn. The extracted plant parts were wet combusted in a high vacuum line and $C^{14}O_2$ was absorbed in hyamine hydroxide and counted in liquid scintillator. The data revealed a similar trend to those in the extracts of plant parts.
Paper chromatographs of extracted plant parts showed unchanged simazine in leaves and stems, and indistinguishable components having Rf values below that of simazine.
The production of $C^{14}O_2$ and wide distribution of radioactivity in sweet corn and cucumber plants treated with simazine $C^{14}$ clearly demonstrate that both resistant and

susceptible plants absorb, translocate, and metabolize simazine.
Sterile and non-sterile soils in 2 enclosed flasks were treated with 10 c simazine-$C^{14}$. Collected $C^{14}O_2$ was counted as barium carbonate in gel scintillator. The data indicate that microorganisms play an important role in the decomposition of simazine in soils.
Since the simazine-$C^{14}$ was uniformly labelled in the triazine ring, the evolution of $C^{14}O_2$ must have resulted from splitting the heterocyclic ring, indicating complete decomposition of the basic structure of simazine. - From Diss.Abstr., 1960, 20,(12),4507. - J.W.F.

1833. CARTER, E.P. (U.S.Dep.Agric., Beltsville,Md,U.S.A.) Volatility of ester forms of hormone type herbicides, III. J.Ass.off.agric.Chem.Wash., 1960, 43,(2), 367-70, figs.1,tabs.3,bibl.4.
The volatility of herbicides is tested by noting plant responses 24 hours after a 24 hour exposure to the herbicide; during the exposure the plants are kept in polythene bags. The results of tests on 25 formulations of 2,4-D or 2,4,5-T are tabulated. - L.K. [O.R.]

1834. SUMNER, C.G. Emulsions in theory and practice. Chem.& Ind., 1960, (34), 1066-70.
A review. [O.W.]

1835. UNITED STATES. Sun causes decomposition. Agric.Res., 1960, 9,(1),15.
Monuron has been found to lose 83% of its effectiveness after 148 days exposure to sunshine. In laboratory tests 28 hours exposure to ultra violet light reduced the effectiveness of monuron and diuron by 75%. - L.K. [O.W.]

1836. DALGAARD-MIKKELSEN, S., RASMUSSEN, F. and SIMONSEN, I.M. Om toksiciteten af ukrudtbekaempelsesmidlet 2-metyl-4-klorfenoxyacetat for kvaeg. [Toxicity for cattle of the weed-killer 2-methyl-4-chlorophenoxyacetate.] Nord.Vet.Med., 1959, 11, 469-74, (Dan.e.g.)
No symptoms of poisoning were observed in 4 heifers grazing for 8 days a field sprayed with MCPA 1 kg/ha. Daily oral administration of 2 and 10 g of MCPA (approximately 6 and 30 mg/kg body weight) to heifers for 3 weeks did not affect general health and did not influence the rumen flora as judged by pH of the rumen fluid, total contents of volatile fatty acids, and glucolytic activity. - Vet.Bull.,Weybridge, 30,(2),92 (modified). - D.M.L.S.

1837. UNITED STATES. Prevention of water weeds. Reclam.Era, 1960, 46,(3),69-70,82, figs.2.
Includes the information that 1-2 p.p.m. of acrolein will kill carp and thread-fin shad while black bass, blue gill and lamprey eel larvae appear to tolerate up to 5 p.p.m. It is recommended that the acrolein content of irrigation water actually contacting crops should not exceed 15 p.p.m. - L.K. [O.W.]

1838. BANDEEN, J.D., SWITZER, C.M. and JONES, G.E. An investigation of pre-planting soil incorporation of herbicides for the control of weeds in sugar beets. Proc.10th Meet.Amer.Soc.Sugar Beet Tech.East U.S. & Canada, 1959, 41-4, tabs.2,bibl.5.
CDEC, chlorpropham, EPTC and endothal all gave much better weed control when incorporated into the soil pre-planting than when applied to the soil surface pre-em. A comparison was also made of the effect of these compounds incorporated, with and without irrigation after planting. Results were not apparently conclusive but endothal and chlorpropham gave better broadleaf control when followed by irrigation. - D.M.L.S. [233(71)]

1839. LEINHARD, G. (Div.Chem.Ser.,Dep.Agric., Pretoria,S.Africa). The effects of 2,4-D on certain physiological aspects of soil microorganisms. S.Afric.J.agric.Sci., 1959, 2,(4), 487-97, (du.f.), figs.5,bibl.10.
Increasing concentrations of 2,4-D over the range of 0-1000 p.p.m. had a more marked effect on the microbial activity assessed by the plate count technique than on that determined in the soil itself. Physiological aspects determined in soils were: the nitrification and ammonification potential, dehydrogenase activity and nitrogen fixation by Azotobacter isolated from a Pretoria soil. The critical range above which the dehydrogenase activity decreased considerably was found to be between 100-200 p.p.m. A concentration of 100 p.p.m. decreased nitrification slightly but somewhat stimulated ammonification. Nitrogen fixation by Azotobacter is reduced seriously at concentrations over 500 p.p.m. The methods employed are described. - From Author's Abstract. - D.M.L.S. [O.RE.]

1840. KLYUCHNIKOV, L.Yu. and PETROVA, A.N. [The effect of the frequent use of herbicides on the soil microflora.] Mikrobiologiya, 1960, 29,238-41, (Russ.e.)

Four applications of 2,4-D, 2 of fuel kerosene and one of 2M-4Kh were made in 1957-58 to an ordinary chernozem after acorns had been planted in 1957 to form a shelterbelt. The herbicides did not affect the number of non-spore-forming bacteria in the oak rhizosphere in July-September 1958, but decreased the number of actinomycetes somewhat. The predominant fungus in the rhizosphere was Trichoderma in the control plots and Penicillium in the treated plots. - Soils & Fert., 23,(4),1663.

## APPLICATION AND MACHINERY

See also 1741,1751,1798.

1841. BECKER, A. (PflSchAmt.,Bad Godesborg, Germany). Wuchsstoffschäden, die uns zu denken geben! [Growth regulator injury giving food for thought!] Gesunde Pflanze, 1960, (8),181-4, (G.), figs.3.
The occurrence of isolated bean plants showing growth regulator injury in a field sprayed with insecticide was attributed to contamination on the wheels of the sprayer being reactivated by the insecticide solvent. - L.K. [O.W.]

1842. SCHÜTZ, K. Höhere Energie bei der Feld-Schädlingsbekämpfung als Mittel zur Steigerung des Nutzeffektes und zur Senkung des Wasseraufwandes. [More energy in field spraying as a means of increasing the efficacy and reducing water consumption.] Landtech.Forsch.,München., 1959, 9,(3),80, bibl.5, (G.e.f.span.)
A theoretical study of the selectiveness and evenness in horizontal and vertical distribution of spray on the target obtained when using water or air as the carrier, and of the energy output required for water supply and transport and in the actual application of spray from the nozzle at rates of 200-1000 l/ha, or 100-300 l/ha when using pneumatic methods. - Abstr.Agric.Hort. Engng, 11,792.

## PHYSIOLOGY, MORPHOLOGY AND ANATOMY

See also 1743,1758,1832.

1843. CRAFTS, A.S. and YAMAGUCHI, S. (Univ.,Davis,Calif.,U.S.A.) Gross autoradiography of solute translocation and distribution in plants. Med.& Biol.Illus., 1960, 10,(2),103-9, figs.10,bibl.2.
These authors have previously described solute movement in plants, using autoradiography of plants treated with solutions of herbicides labelled with the isotope $C^{14}$ (Weed Abstr., 9,1518). This paper described a repetition of the work, using also $P^{32}$, $Zn^{65}$ and $Ca^{45}$ and employing the techniques previously described in reporting on similar works. - P.C. [178(79.4)]

1844. GALSTON, A.W. and PURVES, W.K. (Dep.Bot.,J.W.Gibbs Res.Labs.,Yale Univ., New Haven,Conn.,U.S.A.) The mechanism of action of auxin.Annu.Rev.Plant Physiol., 1960, 11,239-76, bibl.317.
A review giving some indication of the major kinds of explanations advanced and an estimate of their value. Includes discussion of some physiological effects of 2,4-D. - D.M.L.S. [O.W.]

1845. ORMROD, D.P. and WILLIAMS, W.A. (Univ.,Davis,Calif.,U.S.A.) Phosphorus metabolism of Trifolium hirtum All. as affected by 2,4-dichlorophenoxyacetic acid and gibberellic acid. Plant Physiol., 1960, 35,(1),81-7, figs.3,tabs.1,bibl.19.
Young plants of Trifolium hirtum were sprayed with 2,4-D and subsequently harvested at various time intervals for estimation of the phosphorylated constituents in different tissues. Large increases in acid-soluble organic phosphorus occurred in leaves, petioles and stems within 1 minute of treatment. At the same time inorganic phosphorus decreased. In many respects gibberellic acid had similar effects. It is concluded that the action of these 2 compounds is closely related to phosphorus metabolism but there must be differences in effect on other metabolic pathways to account for the varying response induced in plants. - K. Holly. [O.W.]

1846. MACIEJEWSKA-POTAPCZYKOWA, W. [The effect of 2,4-D on the uptake and loss of water by plants.] Zes.naukowe Univ.Lodz, Ser.II, 1957, 95-103.
The effect of 2,4-D was studied on shoots and leaves of Parthenocissus quinquefolia, Oenothera biennis and Chenopodium album. 2,4-D inhibited water uptake by inhibiting respiration and caused an increase in water loss by increasing the permeability of the cuticle. - Chem.Zbl., 131,4561.

1847. LINSER, H. and KIRSCHNER, R. (Ost. Stickstoffwerke, Linz a.d. Donau, Austria). Gegensätzliche Selektivität von 2,4-D-Na und 3-Cl-pyridazin-6-oxyessigsäuren Natrium gegenüber einigen Pflanzenarten. [The opposite selectivity of 2,4-D (sodium) and sodium 3-chloropyridazine-6-oxyacetate on a number of plants.] Naturwissenschaften, 1960, 47, (11), 254-5, (G.), tabs.1.
2,4-D was most toxic to Erodium cicutarium (1) and least toxic to Galium aparine (2) while the other compound was least toxic to (1) and most toxic to (2). To both compounds Centaurea jacea, Lapsana communis and Trifolium pratense were of intermediate susceptibility. - L.K. [O.R.]

1848. SAITBURKHANOV, SH. [Herbicides raise the content of vitamin C.] Nauka Peredov. Opyt Selsk., 1959, (10), 41.
In field experiments in 1958, in which 49-100% weed control was obtained the vitamin C content of feed oats was increased by 2,4-D 2-4 kg/ha, of Allium sp. ("luka-batuma") by calcium cyanamide 200 kg/ha and chlorpropham 16-32 kg/ha. - From Ref.Zh.Biol., 1960, 70913. - L.K.

1849. PATTEN, B.C. (Botany Dep., Rutgers Univ., New Jersey, U.S.A.) Influence of ammonium phosphate buffers on foliar absorption of organic acids. Bot.Gaz., 1959, 120, (3), 137-44, figs.6, tabs.2, bibl.9.
2,4-D, NAA and endothal buffered at various pH levels with ammonium phosphate were applied in solution to terminal buds of Black Valentine beans. The response, measured by inhibition of internode elongation, was independent of the degree of dissociation. There was an empirical correlation between extent of inhibition and curves of buffer capacity. - K. Holly. [O.W.]

1850. KAWAZU, K., FUJITA, T., MITSUI, T., KATO, J. and KATSUMI, M. (Kyoto Univ., Japan). Plant-growth activity of α-alkylphenylacetic acids and 1,2-benzo-1-cycloalkane-3-carboxylic acids. Nature, Lond., 1960, 187, (4738), 694-5, tabs.1, bibl.7.
The compounds tested in the pea straight-growth test were: 1,2-benzo-1-cyclobutene-3-carboxylic acid (m.p. 74.5-75.5°), 1-indancarboxylic acid (m.p. 57.5-58.5°), 1,2,3,4-tetrahydro-1-naphthoic acid (m.p. 83-84°), 1,2-benzo-1-cycloheptene-3-carboxylic acid (m.p. 117-118°), 1,2-benzo-1-cyclooctene-3-carboxylic acid (m.p. 109-110°) and the following phenylacetic acids - α-methyl (b.p. 160-163°/25 mm), α-ethyl (m.p. 40-41°), α-propyl (m.p. 51-52°), α-butyl (b.p. 149-151°/4 mm) and α-amyl (m.p. 35-36°). The structure/activity relationships of the compounds is discussed. - L.K. [O.W.]

1851. GOWING, D.P. and LEEPER, R.W. (Pineapple Res. Inst., Hawaii). Studies on the relation of chemical structure to plant growth regulator activity in the pineapple plant. I. Substituted phenyl and phenoxyalkylcarboxylic acids. Bot.Gaz., 1960, 121, (3), 143-51, tabs.3, bibl.24.
202 phenyl- and phenoxyalkylcarboxylic acids were tested for activity in inducing flowering, inhibiting flowering and causing toxicity to pineapple. Split pea-stem curvatures were also determined. - K. Holly. [O.W.]

1852. LINDER, P.J. and MITCHELL, J.W. (A.R.S. Crops Res. Div., Beltsville, Maryland, U.S.A.) Rapid transport of α-methoxyphenylacetic acid introduced directly into the water stream of bean plants. Bot.Gaz., 1960, 121, (3), 139-42, figs.6, bibl.5.
A technique is described whereby a drop of $C^{14}$ carboxy-labelled α-methoxyphenylacetic acid is applied to the internode of Pinto bean, the stem punctured and tracheary elements severed below the drop, which is absorbed into the stem, and radioactivity estimated in various parts of the plant. Radioactivity moved the 2 in. upward to the primary leaf in 10 seconds but not in 5 seconds. Accumulation within this leaf reached a maximum within 6 minutes. Downward movement only occurred after the compound reached the leaves and then entered the phloem transport system: this downward movement was light dependent and led to root exudation of this compound being also light dependent. - K. Holly. [O.W.]

1853. HAMILTON, R.H., KIVILAAN, A. and McMANUS, J.M. (Crops Res. Div., Agric. Res. Serv., U.S. Dep. Agric.) Biological activity of tetrazole analogues of indole-3-acetic acid and 2,4-dichlorophenoxyacetic acid. Plant Physiol., 1960, 35, (1), 136-40, figs.6, tabs.1, bibl.15.
Compounds were synthesised in which the tetrazole group was substituted for the carboxyl group in indolylacetic acid (IAA) and 2,4-D. The 2,4-D analogue antagonised elongation of oat coleoptile sections induced by both 2,4-D and IAA. On bean plants this analogue appeared to prevent the uptake of 2,4-D. - K. Holly. [O.W.]

1854. LEINWEBER, C.L. and HALL, W.C. (Oklahoma State Univ., U.S.A.) Foliar abscission in cotton. III. Macroscopic and microscopic changes associated with natural and chemically induced leaf-fall. Bot.Gaz., 1959, 121,(1),9-16, figs.5,bibl.17.
Field and greenhouse plants were used for this study, in which endothal (sodium), amitrole, and sodium chlorate + metaborate were used to induce defoliation. Differentiation of the abscission zone in cotton was found to occur very late in leaf maturation. Endothal accelerated leaf fall in the same manner as natural abscission, involving secondary cell division whereas the other two defoliants stimulated a rapid hydrolysis of cell walls across the abscission zone with little or no cell division preceding separation. - K. Holly. [O.W.]

1855. LEINWEBER, C.L. and HALL, W.C. (Oklahoma State Univ., U.S.A.) Foliar abscission in cotton. II. Influence of age and defoliants on chemical composition of blades and pulvinoids. Bot.Gaz., 1959, 120,(3),183-86, tabs.4,bibl.9.
Analyses were conducted on samples collected at intervals over a 10-hour period following application of amitrole and endothal (sodium) in a field experiment. There were no significant changes in K, Ca, Mg and P content following defoliant application. Soluble nitrogen accumulated in the pulvinoid with increasing age and the initiation of abscission. There was considerable accumulation of starch in the leaf blade following endothal treatment. - K. Holly. [O.W.]

1856. LEINWEBER, C.L. and HALL, W.C. (Oklahoma State Univ., U.S.A.) Foliar abscission in cotton. I. Effect of age and defoliants on the respiratory rate of blade, petiole, and tissues of the abscission zone. Bot.Gaz., 1959, 120,(3),144-151, figs.6, tabs.2,bibl.10.
Amitrole, endothal (sodium), sodium chlorate + sodium metaborate, sodium cyanamide, sodium ethyl xanthate and PCP were applied as defoliants to cotton. The effects of amitrole and endothal (sodium) were studied in more detail. Endothal stimulated respiration to a greater extent than did amitrole, but the difference varied with age. Rate of leaf fall was closely correlated with the respiratory rate in the abscission zone. - K. Holly. [O.W.]

1857. CASTELFRANCO, P. (Univ., Davis, Calif., U.S.A.) Inhibition of some metalloprotein enzymes by 3-amino-1,2,4-triazole. Biochim.biophys.Acta, 1960, 41,(3),485-91, figs.4,tabs.3,bibl.22.
Glucose oxidase is not inhibited by amitrole. Tyrosinase and fatty acid peroxidase are inhibited by both amitrole and imidazole. Lactoperoxidase is inhibited by amitrole while horseradish peroxidase and the peroxidase found in seedlings are not inhibited. The inhibition of lactoperoxidase by amitrole is easily reversed by dialysis against dilute saline. Increase in the $H_2O_2$ does not overcome this inhibition. The relationship between amitrole concentration and guaiacol (the reducing agent used in the peroxidase assay) concentration suggests non-competitive inhibition. The possible physiological significance of these findings is discussed. - Author's Summary. [O.R.]

1858. MATELL, M. (Berol AB, Göteborg 14, Sweden). Optical resolution of some auxin-active thiocarbamates. Acta chem.Scand., 1960, 14,(3),677-82, tabs.7,bibl.12.
N,N-dimethylthiocarbamic esters of glycolic, thioglycolic, lactic and thiolactic acid were prepared and shown to give typical auxin responses. The lactic and thiolactic derivatives were optically resolved and shown to possess stereochemical selectivity. The optical antipodes were stable in the crystalline form but rapidly racemised in the melt. N-pentamethylene-thiocarbamic esters of the 4 acids were not auxin-active. - M.E.L. [O.R.]

1859. HALER, A.H. and WHITE, J.D. (Biol. Div., Oak Ridge Nat.Lab., Tennessee, U.S.A.) Action of maleic hydrazide on dormancy, cell division, and cell expansion. Plant Physiol., 1960, 35,(4),495-9, figs.2, tabs.2,bibl.15.
Experiments with lettuce and wheat seed indicate that the effect of MH on seedling growth is largely attributable to an inhibition of cell division and not to any appreciable effect on cell expansion. Absence of specific interactions between MH and gibberellic acid suggest that these do not affect growth through common mechanisms. Some similarities between the effects of MH and of ionising radiation are indicated. - K. Holly. [O.W.]

1860. de BOOIS, H.M., BOTTELIER, H.P. and ZANDEE, D.I. On the different effect of naphthylphthalamic acid on auxin-induced growth and geotropism of decapitated Avena coleoptiles. Proc.Kon.Ned.Akad.v.Wetensch. Ser.C., 1960, 63,(3),375-82, figs.4,bibl.9.
Growth due to the residual auxin in submerged Avena coleoptiles was not affected by NPA even at high concentrations. With concentrations of indolylacetic acid [IAA] below 0.25 p.p.m. NPA inhibited the extra growth caused by the addition of IAA. With supra-optimal IAA concentration growth was stimulated by low NPA concentrations and inhibited by higher ones. The small geotropic curvature due to residual auxin was, however, inhibited by NPA. The effect of NPA on auxin-induced geotropic curvature was similar to that on auxin-induced growth, but the optimal IAA concentration for geotropic curvature was, however, 0.1 p.p.m. It is concluded that NPA inhibits auxin transport thus causing a decrease in the active concentration. In geotropically stimulated coleoptiles NPA also decreases the transverse transport of auxin. - From Authors' Summary. - L.K. [O.R.]

1861. MINSHALL, W.H. (Pest.Res.Inst., Univ.Sub-Post Off.,London,Ontario,Canada). Effect of 3-(4-chlorophenyl)-1,1-dimethylurea on dry matter production, transpiration, and root extension. Canad.J.Bot., 1960, 38,(2),201-16, figs.5,tabs.4,bibl.19.
Extension growth of the chlorophyll-containing roots of Hydrochaeris morsus-ranae was inhibited by 0.5 p.p.m. of monuron whereas concentrations close to the water saturation point of 230 p.p.m. were required to inhibit extension growth of the non-chlorophyll-containing attached roots of Zea mays and Phleum pratense and the detached roots of Pisum sativum.
A total of 15-20 µg monuron/g fresh leaf applied through the cut petiole of detached primary leaves of Phaseolus vulgaris inhibited the increase of dry matter by 90% and suppressed transpiration 40-50%. Internal concentrations of 1-2 µg/g monuron produced simultaneous enhancement of dry matter increase and of transpiration, but concentrations of 5-10 µg/g produced a suppression of dry matter increase concurrently with an enhancement of transpiration. Age of leaf and the time of year in which the plants were grown altered the critical internal concentration levels required to affect dry matter increases and transpiration.
Analysis of detached leaves treated with 15-20 µg/g monuron indicated a marked suppression of the formation of non-water-soluble carbohydrate, a slight suppression of the formation of water-soluble nitrogen, but little or no effect on water-soluble carbohydrate or on non-water-soluble nitrogen.
In detached leaves diuron and fenuron resembled monuron closely in symptom development and in their effect on dry matter production and transpiration. The effects of various respiratory and photosynthetic poisons on the physiology of detached bean leaves is compared with that of monuron. - Mainly Author's Summary. - D.M.L.S. [O.R.]

1862. MERGEN, F. (Sch.For.,Yale Univ.,New York,U.S.A.) A toxic principle in the leaves of Ailanthus. Bot.Gaz., 1959, 121,(1),32-6, figs.2,tabs.1,bibl.12.
Leaves of Ailanthus altissima were found to contain a substance toxic to seedlings of the majority of 35 gymnosperm and 11 angiosperm tree species. It is suggested that this may be of ecological significance and that if isolated and purified it may be of use in weed control. - K. Holly. [O.W.]

## MISCELLANEOUS

1863. WHITTET, J.M. Weeds. N.S.W.Dep. Agric.,Farm Handbk Series, 1959, pp.404, figs.,tabs.
This well-illustrated handbook contains 61 coloured plates of weeds, 10 black and white plates showing details of size and shape of 189 weed seeds, 154 black and white figures, and chapters dealing with the following aspects:- (1) problem weeds of agricultural and pastoral areas, their distribution in N.S.W., methods of reproduction, and introduced plants which have become weeds; (2) weed legislation in N.S.W., hosts for diseases and pests, tainting, weed seeds, and typical weeds of special habitats; (3) poisonous plants and their effects on stock; (4) weed control, including ecological, biological, mechanical and chemical; (5) herbicides; and (6) descriptions of approximately 220 individual species, classified into families, and their control. - J.W.F. [W8(94)]

1864. WOODFORD, E.K. and KASASIAN, L. (Dep.Agric.,Univ.Oxford,England). Some new herbicides: developments in chemical weed control 1958-60. Chem.& Ind., 1960, 36, 1118-25, figs.9,tabs.1,bibl.30.
A review covering both field performance and basic research. - D.M.L.S. [O.W.]

1865. CANADA. Your guide to herbicides used in chemical weed control. Publ. Ont. Dep. Agric., 1960 (rev.), 75D, pp.31.
Includes tables for the susceptibility of 81 common weeds to 2,4-D, MCPA, 2,4-DB, and MCPB and 33 woody weeds to 2,4-D, 2,4,5-T and 2,4-D/2,4,5-T mixtures. The acid equivalent of various commercial brands of these compounds is listed. - D.M.L.S. [235(71)]

1866. SUMIKI, Y. (Univ. Tokyo, Japan). Plant growth regulators. Yuko Gosei Kagaku Kyokaishi, 1960, 18, 79-87, bibl. 62.
A review with 62 references on plant growth regulators including 2,4-DES, 2,4-DB, dalapon, CDAA, fenuron, monuron, diuron, neburon, amitrole and simazine. - Chem. Abstr., 54, 7048i.

1867. UNITED STATES. (N.A.C.A., 1145 19th Street, N.W. Wash. 6, D.C., U.S.A.) Pesticide law manual. Nat. Agric. Chemic. Ass., 1959, (rev.) + Supplement, 1960.
A guide to the laws affecting the use of pesticides in the U.S.A. - L.K. [W6(73)]

1868. UNITED STATES. Noxious weeds of United States. Seed Trade Buyers' Guide, 1960, 120-2.
A useful list of ca. 200 weeds considered noxious in the U.S.A. - P.C. [27(77.3)]

1869. GERMANY. Nachtrag Nr. 4 zum Pflanzenschutzmittel-Verzeichnis 13. Auflage vom März 1960. [Addendum No. 4 to the Plant Pesticide Register 13th Edition of March 1960.] NachrBl. dtsch. PflSchDienst Braunschweig, 1960, 12, (9), 141.
Includes NaClo-Streupulver - a sodium chlorate preparation produced by Elektro-Nitrum-AG. - L.K. [O.W.]

1870. JENSEN, H.L. Biologisk inaktivering af ukrudtsmidler. [The biological inactivation of weedkillers.] Ingr. ugebl., 1959, 3, (23), 4-5, (Dan.)
Includes the information that ca. 500 tons of growth regulator herbicides were used in Denmark in 1958.- L.K. [98(489)]

1871. INTERNATIONAL. F.A.O. Production Yearb. 1959, 1960, 13, pp.484, (E, F, Span.).
Contains inter alia the quantities of herbicides sold or used in agriculture for 1956, 1957 and 1958 for 45 countries (but not the U.K.). - D.M.L.S. [O.W.]

Noted

1872N. MULLER, Z., ZEMANEK, J. and RATAJ, K. Chemicky boj proti plevelum. [Chemical weed control.] Statni Zemed. Nakladatelstvi, Prague, 1960, pp. 151.
From Landw. Lit. Tschecho., 1960, 63.

## List of Common Names and Chemical Abbreviations

Revised August, 1960.

The following list, based on that adopted by the Weed Society of America has been approved by the British Weed Control Council, except those marked □.
An asterisk (*) signifies common names approved by the B.S.I.
A plus sign (+) signifies approval by the Weed Society of America.

| | |
|---|---|
| amiben □+ | 3-amino-2,5-dichlorobenzoic acid |
| amitrole □+ | 3-amino-1,2,4-triazole |
| AMS □+ | ammonium sulphamate |
| atrazine □+ | 2-chloro-4-isopropylamino-6-ethylamino-1,3,5-triazine |
| barbane □ | 4-chloro-2-butynyl-N-(3-chlorophenyl)carbamate |
| CDAA + | 2-chloro-NN-diallylacetamide |
| CDEA + | 2-chloro-NN-diethylacetamide |
| CDEC + | 2-chloroallyl-NN-diethyldithiocarbamate |
| chlorpropham * | isopropyl-N-(3-chlorophenyl)carbamate |
| 4-CPA + | 4-chlorophenoxyacetic acid |
| 4-CPB | 4-(4-chlorophenoxy)butyric acid |
| 2,4-D +* | 2,4-dichlorophenoxyacetic acid |
| 3,4-DA + | 3,4-dichlorophenoxyacetic acid |
| dalapon +* | 2,2-dichloropropionic acid |
| 2,4-DB * | 4-(2,4-dichlorophenoxy)butyric acid |
| DCU +□ | dichloralurea |
| 2,4-DEB + | 2,4-dichlorophenoxyethyl benzoate |
| 2,4-DES * | 2,4-dichlorophenoxyethyl hydrogen sulphate |
| dichlone +* | 2,3-dichloro-1,4-naphthaquinone |
| dinosam * | 2-s-amyl-4,6-dinitrophenol |
| dinoseb * | 2-s-butyl-4,6-dinitrophenol |
| diquat +* | 1,1'-ethylene-2,2'-dipyridylium dibromide |
| diuron + | N-(3,4-dichlorophenyl)-N'N'-dimethylurea |
| DMTT + □ | 3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione |
| DNOC * | 2-methyl-4,6-dinitrophenol or 3,5-dinitro-o-cresol |
| 2,4-DP | 2-(2,4-dichlorophenoxy)propionic acid |
| endothal + | 3,6-endoxohexahydrophthalic acid |
| EPTC +□ | ethyl-NN-dipropylthiolcarbamate |
| erbon + | 2-(2,4,5-trichlorophenoxy)ethyl-2',2'-dichloropropionate |
| fenac □+ | 2,3,6-trichlorophenylacetic acid |
| fenuron + | N-(phenyl)-N'N'-dimethylurea |
| ipazine □+ | 2-chloro-4-diethylamino-6-isopropylamino-1,3,5-triazine |
| MCPA +* | 4-chloro-2-methylphenoxyacetic acid |
| MCPB * | 4-(4-chloro-2-methylphenoxy)butyric acid |
| MCPES + | sodium 4-chloro-2-methylphenoxyethyl sulphate |
| mecoprop * | dl-2-(4-chloro-2-methylphenoxy)propionic acid |
| MH +□ | maleic hydrazide |
| monuron +* | N-(4-chlorophenyl)-N'N'-dimethylurea |
| neburon + | N-(3,4-dichlorophenyl)-N'-butyl-N'-methylurea |
| NPA + | N-1-naphthylphthalamic acid |
| PCP + | pentachlorophenol |
| PMA + | phenyl mercuric acetate |
| propazine +□ | 2-chloro-4,6-bis(isopropylamino)-1,3,5-triazine |
| propham * | isopropyl-N-phenylcarbamate |
| simazine + | 2-chloro-4,6-bis(ethylamino)-1,3,5-triazine |
| SMDC +□ | sodium methyl dithiocarbamate |
| 2,4,5-T +* | 2,4,5-trichlorophenoxyacetic acid |
| 2,4,5-TB | 4-(2,4,5-trichlorophenoxy)butyric acid |
| 2,3,6-TBA + | 2,3,6-trichlorobenzoic acid |
| TCA + | trichloroacetic acid |
| 2,4,5-TES + | sodium 2,4,5-trichlorophenoxyethyl sulphate |
| 2,4,5-TP | 2-(2,4,5-trichlorophenoxy)propionic acid |
| trietazine +□ | 2-chloro-4-diethylamino-6-ethylamino-1,3,5-triazine |
| 3Y9 □ | tris-(2,4-dichlorophenoxyethyl)phosphite |

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